HABITAT TYPING INVENTORY REPORT OVERVIEW
TEN MILE RIVER WATERSHED

INTRODUCTION

A stream habitat inventory was completed in the TMRW within Georgia-Pacific's ownership during the summer/fall months of 1994 and 1995 (Map 1). The inventory provided baseline data on the condition of the habitat available for salmonid species in the watershed. Results will be used to identify and prioritize areas for restoration and enhancement activities.

The surveyed portion of the TMRW is comprised of three main watersheds: North Fork Ten Mile River Watershed (NFTW), Clark Fork Ten Mile River Watershed (CFTW) and South Fork Ten Mile River Watershed (SFTW). The TMRW report is separated into three sections: Section one is a comparison of the three main watersheds. Section two is a breakdown of these watersheds into tributaries and mainstems. Section three is a presentation of individual tributaries and mainstems. The third section is the most detailed while the first is the most general.

METHODS, OVERVIEW

The habitat typing inventory conducted follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi and Reynolds, 1991 rev. 1994). Personnel were trained by California Department of Fish and Game (CDF&G) for 1994 surveys and the California Conservation Corps (CCC) for 1995 surveys. The habitat inventory of TMRW was conducted by a two-person team in 1994 and 1995. A 100 % habitat typing protocol was initiated by CDF&G in 1994 that physically described 100% of the wetted channel. SFTW was inventoried using this protocol. A 10% habitat typing protocol was introduced by CDF&G in 1995 and incorporated into Georgia-Pacific's 1995 habitat typing surveys. The 10% habitat typing protocol physically described 100% of a randomly selected 10% subset of all units encountered (units are defined in the Habitat Typing Inventory Components below). CFTW and NFTW were surveyed using the 10% protocol. In the TMRW, All measurements were taken in US Customary increments.

METHODS, HABITAT TYPING INVENTORY COMPONENTS

A standardized habitat typing inventory data form was developed by CDF&G for use in California stream surveys and (Figure 1). This form was used in the TMRW. There are nine components to the form:

1. Flow:

Flow was measured in cubic feet per second (cfs) at the surveyed stream confluence using a Marsh-McBirney Flo-Mate® Model 2000. Flows were not measured during the 1994 survey season.

2. Channel Type:

Channel typing was conducted according to the classification system developed and revised by Rosgen (1985 rev. 1994). This methodology is described in the California Salmonid Stream Habitat Restoration Manual. The standardized CDF&G channel typing form can be found in Figure 2. Channel typing was conducted simultaneously with habitat typing and followed the standard form to record measurements and observations. There were five measured parameters used to determine channel type:

1) water slope gradient, 2) entrenchment, 3) width/depth ratio, 4) substrate composition, and 5) sinuosity (Figure 3). Definitions of specific channel types can be found in Appendix A.

3. Temperatures:

Temperature was monitored in 1995 in the TMRW by continuos temperature monitoring devices (see "Temperature Stratification Study", TMRW Monitoring Plan). Thus, temperatures were not recorded by habitat typing crews during inventory.

4. Habitat Type:

Habitat typing inventory used the 24 habitat classification types defined by Flosi and Reynolds (1994). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. De-watered units are labeled "Dry". TMRW habitat typing inventory used standard basin level measurement criteria. These criteria required the minimum length of a described habitat unit must be equal to, or greater than, the stream's mean wetted width. Channel dimensions were measured using hip chains, hand levels, tape measures, and stadia rods. All linear measurements were taken in feet to the nearest tenth. As stated in the methods, all units were fully described using the 100% protocol. Using the 10% protocol, all units were measured for mean length; additionally, the first occurrence of each unit type and a randomly selected 10% subset of all units were measured for mean width, mean depth, and maximum depth. For both protocols, pool tail crest depth at each pool unit was measured in the thalweg. Definitions and descriptions of Level I, II, III and IV habitat types are found in Appendix B.

5. Embeddedness:

Depth of cobble embeddedness in pool tail-outs was measured by the percent of the cobble that was embedded into the fine sediment layer beneath. In the TMRW, embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (Value 1), 26 - 50% (Value 2), 51 - 75% (Value 3), 76 - 100% (Value 4). For both protocols, percent embeddedness was measured at all pool tail-outs.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide potential salmonid protection from predation, reduce water velocities for resting, and separation of territorial units to reduce density related competition. The shelter rating could be calculated for each fully-described habitat unit by multiplying shelter value and percent cover. Using an overhead view, a quantitative estimate of the percentage of the unit covered was recorded. The cover present was then classified according to a list of nine cover types on the form in Figure 1. In the TMRW, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings range from 0-300 and were expressed as mean values by habitat types within a stream. Definitions of shelter values can be found in Appendix C.

7. Substrate Composition:

Substrate composition ranges from silt/clay-sized particles to boulders and bedrock elements. In all fully-described habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes and recorded as a one and two respectively. Size classes of substrates are found on the form in Figure 1.

8. Canopy:

Stream canopy was estimated using hand-held spherical densiometers and was a measure of the percentage of water surface shaded by riparian canopy during periods of high solar angle. In the TMRW, an estimate of the percentage of the habitat unit covered by canopy was made from the center of approximately every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample. Canopy area was further analyzed to estimate and record its percentage of coniferous and deciduous trees.

9. Bank Composition and Vegetation:

Bank substrates and vegetation range from bedrock to bare soil and grass to trees. These factors influence the ability of stream banks to withstand winter flows. Dominant bank substrate type (options 1-4) and the dominant bank vegetation type (options 5-9) of both the right and left banks for each fully-described unit were selected from the habitat typing inventory data form (Figure 1). Additionally, percentage of each bank covered by vegetation was estimated and recorded.

METHODS, DATA ANALYSIS

Data from the habitat inventory form were entered into Habitat 7.2 for 10% protocol sampling or Habitat 6.1 for 100% protocol sampling. Both programs were dBASE 4.2 data entry program developed by Tim Curtis, Inland Fisheries Division, California Department of Fish & Game. These programs process and summarize the data, and produce the following seven tables:

- Riffle, Flatwater, and Pool Habitat Types
- Habitat Types and Measured Parameters
- Pool Types
- Maximum Pool Depths by Habitat Types
- Dominant Substrates by Habitat Types
- Mean Percent Shelter by Habitat Types
- Percent Canopy and Bank Vegetation/Substrate

Graphs were produced from the tables using Excel 5.0. Graphs developed for the TMRW include:

- Level I Habitat Types by Percent Occurrence
- Level I Habitat Types by Total Length
- Level IV Habitat Types by Percent Occurrence (not in section 1)
- Maximum Depths in Pools
- Percent Embeddedness
- Dominant Substrate in Low Gradient Riffles
- Percent Canopy
- Percent Pools Formed by Large Woody Debris (only in section 1)

RESULTS

The results for all three sections of this report were presented as recommended in the California Salmonid Stream Habitat Manual (Flosi and Reynolds, 1991 rev. 1994). Since all measurements were taken in whole numbers, results such as mean percents were rounded to the nearest whole number.

Reach maps for all surveyed streams are found in Appendix D.

Results for Mainstem South Fork Ten Mile River (surveyed in summer, 1994), may not reflect current conditions due to a major flood event in the winter of 1994/1995.

A study conducted by the Department of Fish and Wildlife Resources at the University of Idaho found considerable observer variability in classifying habitat types. In this study, all observers had been previously trained to perform habitat typing inventory. Differences among observers in classifying habitat types increased with the number of habitat types and decreased with the level of observer training (Roper and Scarnecchia, 1995). This could lead to possible anomalies in comparing results between 1994 and 1995 surveys.

The California Salmonid Stream Habitat Manual recommended a graph of Mean Percent Cover Types in Pools be included in the results section of each inventory. However, Georgia-Pacific's Resource Department consulting statistician discovered this graph to be a misrepresentation of data; calculations of mean percent cover types were calculated without properly weighting the values. As a result, pools of low occurrence with high or low percents of cover types would bias these mean percents. This error was discovered a week prior to the due date of this report and time did not allow for the proper calculations to be made. This graph includes important information for stream restoration needs and is regretfully excluded from this report. Correct values will eventually be calculated and results will be on file in Georgia-Pacific's Resource Department. Table A compares the example values (Totals A) presented in the California Salmonid Stream Habitat Restoration Manual with the true weighted values (Totals B).

Table A (adapted from the California Salmonid Stream Habitat Restoration Manual to show pool information only)

units measured (occurrence)	habitat type	mean % undercut banks	mean % SWD	mean % LWD	mean % root mass	mean % terr. veg.	mean % aquatic veg.	mean % white water	mean % boulders	mean % bedrock ledges
8	MCP	11.88	8.75	18.75	6.25	0.00	1.25	4.38	48.75	0.00
1	CRP	15.00	15.00	30.00	20.00	0.00	0.00	0.00	20.00	0.00
2	LSR	30.00	5.00	15.00	30.00	0.00	0.00	0.00	20.00	0.00
	Totals A	19.0	9.6	21.3	18.8	0.0	0.4	1.5	29.6	0.0
	Totals B	15.5	8.6	19.1	11.8	0.0	0.9	3.2	40.9	0.0

DISCUSSION and RECOMMENDATIONS

Due to the extensive amount of data, individual discussions and recommendations were not written for section three.

An analysis of riffle/pool ratios was not completed because the information regarding optimum ratios is outdated and a current optimum ratio has not yet been determined (Scott Downey, pers comm. 1996).

D.L.

SECTION 1

WATERSHED INVENTORY REPORT

TEN MILE RIVER WATERSHED

STREAM INVENTORY REPORT
TEN MILE RIVER WATERSHED

WATERSHED OVERVIEW

The Ten Mile River (TMR) is located in central coastal Mendocino County, California with a confluence legal description of T19N R17W SEC33. The Ten Mile River Watershed (TMRW) covers an area of close to 115 square miles (298 sq. km)and consists of three main surveyed watersheds: North Fork Ten Mile River Watershed (NFTW), Clark Fork Ten Mile River Watershed (CFTW) and South Fork Ten Mile River Watershed (SFTW). Mainstem Ten Mile River is not owned by Georgia Pacific and was not surveyed. The TMRW drains approximately 71,389 acres (28,891 ha) and close to 109 miles (175 km) of surveyed Class 1 watercourses. Elevations throughout the TMRW range from 20 feet (6.1 m) to 3,000 feet (914 m). Habitat inventory was conducted during summer/fall months from June 15, 1994 through November 2, 1995 by Diana Hines, David Lundby and Warren Mitchell. For clarity, the inventory results for the three main watersheds are presented separately,

NORTH FORK TEN MILE RIVER WATERSHED HABITAT INVENTORY RESULTS

The North Fork Ten Mile Watershed (NFTW) is comprised of Mainstem North Fork Ten Mile (NFT) and its tributaries (NFTT). NFTW elevations range from 40 feet (12. m) at the mouth to 2,200 feet (671 m) in the headwater areas and drains approximately 24,967 acres (10104 ha). The NFT's legal description at the confluence with the Ten Mile River (TMR) is T20N R17W Sec25. Its location is 39° 33' 53 "N. latitude and 123° 42' 30"W. longitude on the USGS Dutchmans Knoll 7.5 minute quadrangle. In addition to NFT, ten Class 1 tributaries were surveyed: Little North Fork Ten Mile, Cavanough Gulch, O'Connor Gulch, Bald Hill Creek, Gulch 8, Gulch 11, Gulch 19, Patsy Creek, Gulch 23 and Mill Creek[1].

The habitat inventory of July 27, 1995 through November 2, 1995 was conducted by Dave Lundby, Diana Hines and Dave Wright.

A total of 205,212 feet (38.9 miles, 62.6 km) were surveyed for the NFTW. All of the surveyed miles consisted of anadromous fish habitat.

Table I summarizes the Level II Riffle, Flatwater and Pool Habitat Types. By percent occurrence Riffles comprised 27%, Flatwater 31% and Pools 40 % of the Habitat Types (Graph 1). By percent total length, Riffles comprised 20%, Flatwater 43% and Pools 32% (Graph 2).

Twenty-two Level IV Habitat Types were identified and are summarized in Table 2. The most frequently occurring Habitat Types were 23% Low Gradient Riffles, 19% Mid Channel Pools and 15% Step Runs (Graph 3). The most prevalent habitat types by percent total length were Step Runs at 27%, Low Gradient Riffles 18%, and Mid Channel Pools 13%.

[1] Mill Creek (a tributary to TMR) was placed into NFT Tributaries for convenience

Table 3 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Overall, Scour Pools were the most often encountered at 51% occurrence and comprised 56% of the total length of Pools.

Table 4 is a summary of maximum pool depths by Pool Habitat Types. Pools with a depth of 2 feet (.61 m) or greater are considered optimal for fish habitat. In the NFTW, 828 of the 1,702 pools (49%) had a depth of 2ft or greater (Graph 6).

The depth of cobble embeddedness was estimated at pool tail-outs. Of pool tail-outs measured, 3% had a value of 1, 11% had a value of 2, 21% had a value of 3, and 64% had a value of 4 (Graph 7).

Of the Level II Habitat Types, Pools had the highest mean shelter at 50 (Table 1). Of the Level III Pool Types, Backwater Pools had the highest mean shelter rating at 57 (Table 3).

Of the 1,702 pools, 18 % were formed by Large Woody Debris: 9 % by logs and 8 % by root wads (calculated from Table 4).

Table 6 summarizes the dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 74% had gravel as the dominant substrate (Graph 8).

Mean percent closed canopy was 86%: 33% coniferous, 53% deciduous. Mean percent open was 14% (Graph 9).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. Mean percent right and left banks vegetated were each 63%. Deciduous trees were the dominant bank vegetation type in 40% of the units fully measured. Additionally, coniferous trees were the dominant bank vegetation type in 30% of the units fully measured. The dominant substrate composing the structure of the stream banks consisted of Sand/Silt/Clay, found in 59% of the units fully measured.

CLARK FORK TEN MILE RIVER WATERSHED HABITAT INVENTORY RESULTS

The CFTW is comprised of Mainstem Clark Fork Ten Mile River (CFT) and its tributaries (CFTT). CFTW elevations range from 140 feet (43 m)at the mouth of CFT to 3,000 feet in the headwater areas and drains approximately 21,400 acres (8661 ha). CFT is a tributary to the TMR with a confluence location of T20N R17W Sec25, 39° 33’53" N. latitude, 123°42’30" W. longitude on the USGS Dutchmans Knoll 7.5 minute quadrangle. In addition to CFT, four Class 1 tributaries were surveyed: Bear Haven Creek, Little Bear Haven Creek, Booth Gulch and Gulch 27.

The habitat inventory of August 17, 1994 through July 18, 1995, was conducted by Diana Hines, David Lundby and Warren Mitchell. The total length of stream surveyed was 154,857 feet (29.3 miles, 47.1 km) (Table 8). Side channels comprised 1,540 feet (469 m) of this total. A 30 foot (9.1 m) waterfall in upper CFT is a barrier to anadromous fish migration. Gulch 27 is located upstream of the waterfall. The total survey length of anadromous fish habitat in the CFTW is 77,247 feet (14.7 miles, 23.7 km). The remaining 18,997 feet (3.6 miles, 5.2 km) were surveyed as fish bearing habitat (this includes Gulch 27) due to fish stocking upstream of this waterfall.

Table 8 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 25%, Flatwater 30% and Pools 43% (Graph 1). Of the total survey length, Riffles comprised 16%, Flatwater 43% and Pools 38% (Graph 2).

Twenty-two Level IV Habitat Types were identified (Table 2). Of the Level IV Habitat Types, the most frequently occurring were Low Gradient Riffles 21%, Mid Channel Pools 18% and Step Runs 16%. Of the total survey length, Step Runs comprised 32%, Mid Channel Pools 15% and Low Gradient Riffles 12% (Table 9).

Table 10 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Scour pools were most often encountered at 54% occurrence and comprised 57% of the total length of pools.

Table 11 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In CFTW, 690 of the 1,079 pools (64%) had a depth of two feet or greater (Graph 3).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 1,079 pool tail-outs measured in CFTW, 1% had a value of 1, 6% had a value of 2, 24% had a value of 3 and 68% had a value of 4 (Graph 4).

Of the Level II Habitat Types, Riffles had the highest mean shelter rating at 40 (Table 8). Of the Level III Pool Habitat Types, Scour pools had the highest mean shelter rating at 46 (Table 10).

Of the 1,079 pools, 19% were formed by Large Woody Debris: 14% by logs and 5% by root wads (Graph 5, calculated from Table 12).

Table 13 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 60% had gravel as the dominant substrate type (Graph 6).

Mean percent closed canopy was 84%: 38% coniferous trees and 46% deciduous trees. Mean percent open canopy was 16% (Graph 8, calculated from Table 14).

Mean percent right bank vegetated was 57% while mean percent left bank vegetated was 60%. Deciduous trees occurred most often as bank vegetation at a mean percent of 43 (of units fully measured). Sand/Silt/Clay occurred most often as bank substrate with a mean percent of 58 (of units fully measured) (Table 14).

SOUTH FORK TEN MILE RIVER WATERSHED HABITAT INVENTORY RESULTS

The SFTW is comprised of Mainstem South Fork Ten Mile River (SFT) and its tributaries (SFTT). SFTW elevations range from 20 feet at the mouth to 3,000 feet in the headwater areas and drains approximately 19,620 acres (7940 ha). SFT is a tributary to the TMR with a confluence location of T19N R17W Sec03, 39° 32’23" N. latitude, 123°44’42" W. longitude on the USGS Dutchmans Knoll 7.5 minute quadrangle. In addition to SFT, four Class 1 tributaries were surveyed: Smith Creek, Campbell Creek, Churchman Creek and Redwood Creek.

The habitat inventory of June 15 through August 16, 1994, was conducted by David Lundby and Warren Mitchell. The total length of stream surveyed was 213,642 feet (40.5 miles, 65.2 km) (Table 15). Side channels comprised 3,045 feet (928 m) of this total.

Table 15 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 24%, Flatwater 33% and Pools 41% (Graph 1). Of the total survey length, Riffles comprised 15%, Flatwater 56% and Pools 25% (Graph 2).

Twenty Level IV Habitat Types were identified (Table 16). Of the Level IV Habitat Types, the most frequently occurring were Low Gradient Riffles 23%, Step Runs 20% and Runs 13%. Of the total survey length, Step Runs comprised 44%, Low Gradient Riffles 14% and Runs 12% (Table 16).

Table 17 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Scour pools were most often encountered at 73% occurrence and comprised 71% of the total length of pools.

Table 18 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In SFTW, 688 of the 1,117 pools (58%) had a depth of two feet or greater (Graph 3).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 1,117 pool tail-outs measured in SFTW, 0% had a value of 1, 0% had a value of 2, 19% had a value of 3 and 81% had a value of 4 (Graph 4).

Of the Level II Habitat Types, Pools had the highest mean shelter rating at 36 (Table 15). Of the Level III Pool Habitat Types, Scour pools had the highest mean shelter rating at 40 (Table 17).

Of the 1,117 pools, 42% were formed by Large Woody Debris: 30% by logs and 12% by root wads (Graph 5, calculated from Table 19).

Table 20 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 93% had gravel as the dominant substrate type (Graph 6).

Mean percent closed canopy was 81%: 38% coniferous trees and 43% deciduous trees. Mean percent open canopy was 19% (Graph 9, calculated from Table 21).

Mean percent right bank vegetated was 64% while mean percent left bank vegetated was 66%. Deciduous trees occurred most often as bank vegetation at a mean percent of 39 (of units fully measured). Sand/Silt/Clay occurred most often as bank substrate with a mean percent of 90 (of units fully measured) (Table 21).

TEN MILE RIVER WATERSHED DISCUSSION

The information gathered from the habitat typing inventory will provide Georgia-Pacific with baseline data on the current condition of the watershed and the available habitat for salmonids. This data will then be used to identify components of the habitat which are in need of enhancement so the appropriate conditions for salmonids can be improved throughout the watershed.

Pool Depth

According to Flosi and Reynolds (1994), a stream with 50% or more of its total habitat comprised of primary pools is generally desirable. Primary pools are at least two feet deep in first and second order streams and at least three feet deep in third and fourth order streams. Although the NFTW had less than 50% primary pools, the SFTW and CFTW were well above 50% primary pools indicating favorable depths for salmonids.

Large Woody Debris

The presence of Large Woody Debris (LWD) in streams is a significant component of fish habitat. Woody debris creates areas of low flow, providing a refuge for fish during periods of high flow (Robison and Beschta, 1990). Woody debris also provides cover for fish, lowering the risk of predation. Due to the problems with Table 5 (see Habitat Typing Inventory Overview), we were unable to determine the mean percents of woody debris as cover. However, we were able to determine the percent of pools formed by LWD. The SFTW had the highest percent (42%) LWD formed pools in the TMRW with NFTW and CFTW trailing at 18% and 19% respectively. Whether these numbers are high or low, relative to the needs of salmonids, is difficult to ascertain since the optimum amount of woody debris in streams has not been specified (Robison and Beschta 1990). However, based on data from this year's Aquatic Vertebrate Study, a possible association was found between Coho sites and the occurrence of pools formed by LWD: The only Coho found were in creeks where there was a large percentage of LWD. This suggests that a low percentage of LWD formed pools could adversely affect juvenile Coho populations (C.S. Shirvel 1990) The four creeks with Coho had over 30% LWD formed pools.

Canopy

There are two important benefits of canopy cover in coastal streams. Canopy keeps stream temperatures cool as well as providing nutrients in the form of leaf litter and organic material (Bilby 1988). A canopy cover of 80% or higher is considered optimum, Flosi and Reynolds (1994). All three watersheds in the TMRW had mean percent canopy cover above 80%.

In the NFTW, deciduous trees occupied a slightly larger portion of the canopy than did coniferous trees. The SFTW, had a more or less equal percents of deciduous and coniferous canopy as did the CFTW. Wood from alder and most other deciduous species deteriorates more rapidly than wood from coniferous species (Sedell, *et al*. 1988). This would leave less LWD in the stream available for fish cover and LWD formed pools.

Substrate

Since salmon generally create redds at the heads of riffles, we were mainly concerned with the dominant substrate in these units. Reiser and Bjornn (1979) reported substrate between .50 and 4.0 inches (1.3 - 10.2 cm) is suitable spawning habitat for Coho. The scale used to determine gravel size in this habitat survey was .08-2.5 inches which was similar to the above range. The majority of the Low Gradient Riffles in the TMRW had gravel as the dominant substrate. The SFTW had the highest percentage (93%) of riffles with gravel as the dominant substrate. The high presence of gravel in riffles indicates that there is a sufficient amount of substrate available as potential spawning habitat throughout the TMRW.

Embeddedness

Though there are sufficient levels of the necessary substrate for spawning habitat, the high embeddedness values found throughout the TMRW could hinder the survival of the eggs deposited in the redds. High silt levels reduce water circulation within the substrate, thus lowering the oxygen levels needed by salmonid eggs (Sandercock, 1991).

Substrate embedded with silt in varying degrees were given corresponding values as follows: 0-25%= value 1, 26 - 50% = value 2, 51 - 75% = value 3 and 76 - 100% = value 4. According to Flosi and Reynolds (1994), creeks with embeddedness values of two or higher are considered to have poor quality fish habitat. In the TMRW, most of the pool tail-outs measured had embeddedness values of two or more.

It is important to consider, however, that the above embeddedness values were obtained in the summer during low flow conditions. In winter and spring, flows are usually higher due to the rainy season and the lowered evapotranspiration of the trees. This higher flow probably decreases the amount of fines allowed to settle. As a result, winter and spring flows would yield lower embeddedness values than in the summer.

Overall, the TMRW appears to provide suitable habitats for anadromous salmonids. The TMRW is expected to improve overtime as this river system approaches its natural equilibrium. Georgia-Pacific will attempt to enhance this approach through sound management practices and restoration and enhancement projects.

TEN MILE RIVER WATERSHED RECOMMENDATIONS

The TMRW should be managed as an anadromous, natural production watershed.

Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

Mean percents of cover types in pools have not yet been calculated. However, upon completion of these calculations, insufficient woody debris cover types in pools need to be identified and prioritized. Pools lacking in woody debris cover types should be augmented with recruitment of woody debris.

Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediment entering the watershed. In addition, sediment sources related to road systems need to be identified, mapped and treated according to their potential for sediment yield to the watershed.

Increase the canopy in the TMRW by planting willow, alder, redwood and Douglas-fir along the watercourses where shade canopies are not at acceptable levels. Planting efforts need to be coordinated to follow bank stabilization or upslope erosion control projects.

Log debris accumulations retaining large quantities of fine sediment should be modified carefully, over time, to avoid excessive sediment loading in downstream reaches.

D.L.

SECTION 2

WATERSHED INVENTORY REPORTS

NORTH FORK TEN MILE RIVER WATERSHED, TRIBUTARIES AND MAINSTEM

CLARK FORK TEN MILE RIVER WATERSHED, TRIBUTARIES AND MAINSTEM

SOUTH FORK TEN MILE RIVER WATERSHED, TRIBUTARIES AND MAINSTEM

STREAM INVENTORY REPORT
NORTH FORK TEN MILE WATERSHED

WATERSHED OVERVIEW

The North Fork Ten Mile Watershed (NFTW) is comprised of Mainstem North Fork Ten Mile (NFT) and its tributaries (NFTT). NFTW elevations range from 40 feet (12 m) at the mouth to 2,200 feet (670 m) in the headwater areas and drains approximately 24,967 acres (10,104 ha). The NFT's legal description at the confluence with the Ten Mile River (TMR) is T20N R17W Sec25. Its location is 39° 33' 53 "N. latitude and 123° 42' 30"W. longitude on the USGS Dutchmans Knoll 7.5 minute quadrangle. In addition to NFT, ten Class 1 tributaries were surveyed: Little North Fork Ten Mile, Cavanough Gulch, O'Connor Gulch, Bald Hill Creek, Gulch 8, Gulch 11, Gulch 19, Patsy Creek, Gulch 23 and Mill Creek[2]. In the NFTW, there are an additional six unsurveyed tributaries located off Georgia-Pacific property. The results of the NFTW are presented in three parts: the NFT mainstem, surveyed tributaries (NFTT) and the NFTW.

NORTH FORK TEN MILE WATERSHED HABITAT INVENTORY RESULTS

The results of the NFTW consist of the cumulation of the habitat inventory of the NFT mainstem and its tributaries. The habitat inventory of July 27, 1995 through November 2, 1995 was conducted by Dave Lundby, Diana Hines and Dave Wright.

A total of 205,212 feet (38.9 miles, 62 km) were surveyed for the NFTW. All of the surveyed miles consisted of anadromous fish habitat.

Table I summarizes the Level II Riffle, Flatwater and Pool Habitat Types. By percent occurrence Riffles comprised 27%, Flatwater 31% and Pools 40 % of the Habitat Types (Graph 1). By percent total length, Riffles comprised 20%, Flatwater 43% and Pools 32% (Graph 2).

Twenty-two Level IV Habitat Types were identified and are summarized in Table 2. The most frequently occurring Habitat Types were 23% Low Gradient Riffles, 19% Mid Channel Pools and 15% Step Runs (Graph 3). The most prevalent habitat types by percent total length were Step Runs at 27%, Low Gradient Riffles 18%, and Mid Channel Pools 13%.

Table 3 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Overall, Scour Pools were the most often encountered at 51% occurrence and comprised 56% of the total length of Pools.

Table 4 is a summary of maximum pool depths by Pool Habitat Types. Pools with a depth of two feet (.61 m) or greater are considered optimal for fish habitat. In the NFTW, 828 of the 1,702 pools (49%) had a depth of two feet or greater (Graph 6).

[2] Mill Creek (a tributary to TMR) was placed into NFT Tributaries for convenience

The depth of cobble embeddedness was estimated at pool tail-outs. Of pool tail-outs measured, 3% had a value of 1, 11% had a value of 2, 21% had a value of 3, and 64% had a value of 4 (Graph 7).

Of the Level II Habitat Types, Pools had the highest mean shelter at 50 (Table 1). Of the Level III Pool Types, Backwater Pools had the highest mean shelter rating at 57 (Table 3).

Of the 1,702 pools, 18 % were formed by Large Woody Debris: 9 % by logs and 8 % by root wads (calculated from Table 4).

Table 6 summarizes the dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 74% had gravel as the dominant substrate (Graph 8).

Mean percent closed canopy was 86%: 33% coniferous, 53% deciduous. Mean percent open was 14% (Graph 9).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. Mean percent right and left banks vegetated were each 63%. Deciduous trees were the dominant bank vegetation type in 40% of the units fully measured. Additionally, coniferous trees were the dominant bank vegetation type in 30% of the units fully measured. The dominant substrate composing the structure of the stream banks consisted of Sand/Silt/Clay, found in 59% of the units fully measured.

NORTH FORK TEN MILE TRIBUTARIES HABITAT INVENTORY RESULTS

The total length of stream in NFTT surveyed was 121,301 feet (23.0 miles, 36.8 km) (Table 8). These surveyed tributaries include Blair Gulch, Barlow Gulch, Buckhorn Creek and McGuire Creek.

Table 8 summarizes the Level II Riffle, Flatwater, and Pool Habitat Types. By percent occurrence, Riffles comprised 29%, Flatwater Habitat Types 30% and Pools 39% of the Habitat Types in the NFTT (Graph 1). By percent total length, Habitat Types in NFTT consisted of 23% Riffles, 47% Flatwater units and 21% Pools (Graph 2).

Twenty-one Level IV Habitat Types were identified in NFTT and are summarized in Table 9. The most frequently occurring Habitat Types were Low Gradient Riffles 24%, Mid Channel Pools 19% and Step Runs 18% (Graph 4). The most prevalent Habitat Types by percent total length were Step Runs at 38%, Low Gradient Riffles at 19% and Mid Channel Pools at 10%.

Table 10 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Main Pools were most often encountered at 50% occurrence and comprised 47% of the total length of pools.

Table 11 is a summary of maximum pool depths by Pool Habitat Types. Pools with a depth of two feet (.61 m) or greater are considered optimal for fish habitat. Of the 1,205 pools in NFTT, 413 (34%) had a depth of two feet or greater (Graph 6).

The depth of cobble embeddedness was estimated at pool tail-outs. In NFTT, 4% of the pool tail-outs measured had a value of 1, 12% had a value of 2; 23% had a value of 3, and 61% had a value of 4 (Graph 7).

Of the Level II Pool Types, Pool Habitat Types had the highest mean shelter rating at 53 (Table 8). Of the Level III Pool Types, Backwater Pools had the highest mean shelter rating at 60 (Table 10).

Of the 1,205 pools, 17 % were formed by Large Woody Debris: 10 % by logs and 7% by root wads (calculated from Table 11).

Table 13 summarizes the dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles measured, 78% had gravel as the dominant substrate (Graph 8).

Mean percent closed canopy was 91%: 39% coniferous trees and 52% deciduous trees. Mean percent open was 9% (Graph 10).

Table 14 summarizes the mean percent substrate/vegetation types found along the banks of the stream. In the NFT tributaries, the mean percent right and left banks vegetated were each 63%. Coniferous trees were the dominant vegetation type observed in 34% of the units fully measured. Additionally, 29% of the units had deciduous trees as the dominant vegetation, including downed trees, logs, and root wads. The dominant substrate composing the structure of the stream banks consisted of Sand/Silt/Clay, found in 60% of the units fully measured.

NORTH FORK TEN MILE MAINSTEM HABITAT INVENTORY RESULTS

The total length of stream in NFT mainstem surveyed was 83,424 feet (16.0 miles, 25.6 km) including 1,299 feet of side channels (Table 15).

Table 15 summarizes the Level II Riffle, Flatwater, and Pool Habitat Types. By percent occurrence, Riffles comprised 23%, Flatwater 33% and Pools 45% of the Habitat Types (Graph 1). By percent total length, Riffles comprised 16%, Flatwater 37% and Pools 47% (Graph 2).

Eighteen Level IV Habitat Types were identified in NFT and are summarized in Table 16. The most frequently occurring Habitat Types were Low Gradient Riffles 21%, Mid Channel Pools 18% and Runs 15% (Graph 5). The most prevalent Habitat Types by percent total length were Mid Channel Pools 18%, Low Gradient Riffles 15% and Lateral Scour Bedrock Pools as well as Glides, both at 14%.

Table 17 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Scour Pools were most often encountered at 57% occurrence and comprised 60% of the total length of pools.

Table 18 is a summary of maximum pool depths by Pool Habitat Types. Pools with depths of two feet (.61 m) or greater are considered optimal for fish habitat. In NFT, 415 of the 497 pools (84%) had a depth of two feet or greater (Graph 6).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 497 pool tail-outs measured, 2% had a value of 1, 9% had a value of 2, 16% had a value of 3 and 72% had a value of 4 (Graph 7).

Of the Level II Habitat Types, Pool habitats had the highest mean shelter rating in NFT at 36 (Table 15). Of the Level III Pool Types in NFT, Scour Pools had the highest mean shelter rating at 40 (Table 17).

Of the 497 Pools, 19% were formed by Large Woody Debris: 8% by logs and 11% by root wads (calculated from Table 18).

Table 20 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles measured, 63% had Gravel as the dominant substrate (Graph 8).

Mean percent closed canopy was 70%: 15% coniferous trees and 55% deciduous trees. Mean percent open was 30% (Graph 11).

Table 21 summarizes the mean percent substrate/vegetation types found along the banks of the stream. The mean percent right bank vegetated was 64% while the mean percent left bank vegetated was 66%. Deciduous trees were the dominant bank vegetation type observed in 81% of the units fully measured. Coniferous trees were the dominant bank vegetation type in 12% of the units fully measured. The dominant substrate composing the structure of the stream banks was Sand/Silt/Clay, found in 58% of the units fully measured.

DISCUSSION

The information gathered in the process of habitat typing will provide Georgia-Pacific with baseline data on the current condition of the watershed and the available habitat for salmonids. This data will then be used to identify components of the habitat which are in need of enhancement so that the appropriate conditions for salmonids can be improved throughout the watershed.

Pool Depth

According to Flosi and Reynolds (1994), a stream with 50% of its total habitat comprised of primary pools is generally desirable. Primary pools are at least two feet deep in first and second order streams and at least three feet deep in third and fourth order streams. The information from graph 6 on maximum depth in pools was used to determine percent of primary pools. Overall, the NFTW consists of 49% primary pools. NFTT, which are mostly first and second order streams, have relatively shallow pools. Only 34% of the pools are two feet or greater in depth. However, the NFT mainstem, a third order stream, has relatively deep pools with 52% of the pools having a depth of three feet or more.

Large Woody Debris

The presence of Large Woody Debris (LWD) in streams is a significant component of fish habitat. Woody debris creates areas of low flow, providing a refuge for fish during periods of high flow (Robison and Beschta, 1990). Woody debris also provides cover for fish, lowering the risk of predation. Due to the previously discussed problems with Table 5, we were unable to determine the amount of area in the units surveyed which had woody debris as cover. We were, however, able to determine the percent of pools formed by LWD. In the NFTW 18% of the pools were formed by LWD. The tributaries consisted of 17% LWD formed pools and the NFT mainstem consisted of 19% LWD formed pools. This is relatively low compared to the South Fork Ten Mile watershed, which had 42% of its pools formed by LWD. Whether these numbers are high or low, relative to the needs of

salmonids, is difficult to ascertain since the optimum amount of woody debris in streams has not been specified (Robison and Beschta 1990). However, based on data from this year's Aquatic Vertebrate Study, a possible association was found between Coho sites and the occurrence of pools formed by LWD: The only Coho found were in creeks where there was a large percentage of LWD. This suggests that a low percentage of LWD formed pools could adversely affect juvenile Coho populations (Shirvel 1990). Creeks with Coho in the TMRW had over 30% LWD formed pools.

Canopy

There are two important benefits of canopy cover in coastal streams. Canopy keeps stream temperatures cool as well as providing nutrients in the form of leaf litter and organic material (Bilby 1988). Mean percent canopy cover for the NFTW was 86%. This is relatively high since a canopy cover of 80% or higher is considered optimum, Flosi and Reynolds (1994). Mean percent canopy cover in the tributaries was high at 91%. Hobo data confirms that tributaries provide cool water influence to the mainstem; this may be due, in large part, to the higher percentage of canopy in the tributaries. NFT mainstem had a lower mean canopy cover of 70%.

Deciduous trees occupied a considerably larger portion of the canopy than did coniferous trees. In both the tributaries and the mainstem, deciduous trees comprised just over 50% of the canopy. Coniferous trees comprised 39% in the tributaries and only 15% in the mainstem. The significance of this is that wood from Alder and most other deciduous species deteriorates more rapidly than wood from coniferous species (Sedell, *et al*. 1988). This would leave less LWD in the stream available for fish cover and LWD formed pools. A possible correlation may exist between low percentages of coniferous trees along the creek and low percentages of LWD formed pools.

Substrate

Since salmon generally create redds at the heads of riffles we were mainly concerned with the dominant substrate in these units. Reiser and Bjornn (1979) reported substrate between .50 and 4.0 inches (1.3 - 10.2 cm) is suitable spawning habitat for Coho. The scale used to determine gravel size in this habitat survey was .08-2.5 inches which was similar to the above range. The majority of the Low Gradient Riffles in the NFTW (74%) had gravel as the dominant substrate. NFT tributaries had a higher percentage (78%) of riffles with gravel as the dominant substrate than did the NFT mainstem (63%). The relatively high presence of gravel in riffles indicates that there is a sufficient amount of substrate available as potential spawning habitat throughout the watershed.

Embeddedness

Though there are sufficient levels of the necessary substrate for spawning habitat, the relatively high embeddedness values found throughout the NFTW could hinder the survival of the eggs deposited in the redds. High silt levels reduce water circulation within the substrate, thus lowering the oxygen levels needed by salmonid eggs (Sandercock, 1991).

Substrate embedded with silt in varying degrees were given corresponding values as follows: 0-25%= value 1, 26 - 50% = value 2, 51 - 75% = value 3 and 76 - 100% = value 4. According to Flosi and Reynolds (1994), creeks with embeddedness values of two or higher are considered to have poor quality fish habitat. In the NFTW, 96% of the pool tail-outs measured had embeddedness values of two or more. The embeddedness values for the tributaries and the mainstem were almost equal, with

the tributaries having 96% of its pools with values of two or more and the mainstem 97%. These data correspond to that found from sediment sampling within the TMRW: The NFT mainstem had the highest mean percentage of fines (22.27%) for 1995. The NFT mainstem is the principal target for enhancement and restoration work in 1995/96 in the TMRW in an effort to reduce sediment input.

It is important to consider, however, that the above embeddedness values were obtained in the summer during low flow conditions. In winter and spring, flows are usually higher due to the rainy season and the lowered evapotranspiration of the trees. This higher flow probably carries away much of the silt previously deposited. Since spawning usually occurs during the winter, the substrate may not be as embedded as in the summer.

Factors influencing embeddedness may be due to a variety of circumstances. Before the Forest Practice Rules were established, the NFTW was heavily tractor logged. Tractors were run right through the creek in the process of removing logs. Along the upslope terrain, there was additional impact on the soil because the area was torn up and vulnerable to erosion during rainfall. This type of logging has more impact on the soil than cable logging.

Another factor contributing to embeddedness was the past road conditions along the NFT mainstem. Much of the NFT, especially above O'Conner Gulch, has been inaccessible until recently. The old logging roads were not maintained and could have contributed fines to the creek as a result of eroded sections. More recently, small sized culverts were placed along the roads to help catch excess runoff and prevent erosion of the roads. These culverts, however, became obstructed with debris and silt during periods of high flow, thereby obstructing passage for fish. To help alleviate this problem, larger culverts have been installed to replace the smaller ones. In the interim, however, all the debris and sediment which was previously concentrated above the culvert is now being flushed through these culverts and into the creek. This could be another factor contributing to the higher levels of embeddedness. We are hopeful that the short term negative effect will be outweighed by the long term benefits of opening up the creek for more salmonid habitat.

Georgia-Pacific will attempt to maintain a healthy environment for salmonids in this watershed through sound management practices and restoration and enhancement projects.

RECOMMENDATIONS

The NFTW should be managed as an anadromous, natural production watershed.

Where feasible, design and engineer pool enhancement structures to increase the number and depth of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

Mean percents of cover types in pools have not yet been calculated. However, upon completion of these calculations, insufficient woody debris cover types in pools need to be identified and prioritized. Pools lacking in woody debris cover types should be augmented with recruitment of woody debris.

Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediment entering the watershed. In addition, sediment sources related to road systems need to be identified, mapped and treated according to their potential for sediment yield to the watershed.

Increase the canopy in the NFT by planting native species of willow, alder, redwood and Douglas-fir along the watercourses where shade canopies are not at acceptable levels. Planting efforts need to be coordinated to follow bank stabilization or upslope erosion control projects.

Log debris accumulations retaining large quantities of fine sediment should be modified carefully, over time, to avoid excessive sediment loading in downstream reaches.

D.I.H

STREAM INVENTORY REPORT
CLARK FORK TEN MILE RIVER WATERSHED

WATERSHED OVERVIEW

The Clark Fork Ten Mile River Watershed (CFTW) is comprised of Mainstem Clark Fork Ten Mile River (CFT) and its tributaries (CFTT). CFTW elevations range from 140 feet at the mouth of CFT to 3,000 feet in the headwater areas and drains approximately 21,400 acres. CFT is a tributary to the Ten Mile River (TMR) with a confluence location of T20N R17W Sec25, 39° 33'53" N. latitude, 123°42'30" W. longitude on the USGS Dutchmans Knoll 7.5 minute quadrangle. In addition to CFT, four Class 1 tributaries were surveyed: Bear Haven Creek, Little Bear Haven Creek, Booth Gulch and Gulch 27. For clarity, habitat inventory results for CFTW, CFTT and CFT are presented separately.

CLARK FORK TEN MILE RIVER WATERSHED HABITAT INVENTORY RESULTS

The habitat inventory of August 17, 1994 through July 18, 1995, was conducted by Diana Hines, David Lundby and Warren Mitchell. The total length of stream surveyed was 154,857 feet (29.3 miles) (Table 1). Side channels comprised 1,540 feet of this total. A 30 foot waterfall in upper CFT is a barrier to anadromous fish migration. Gulch 27 is located upstream of the waterfall. The total survey length of anadromous fish habitat in the CFTW is 77,247 feet (14.7 miles). The remaining 18,997 feet (3.6 miles) were surveyed as fish bearing habitat (this includes Gulch 27) due to fish stocking upstream of this waterfall.

Table 1 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 25%, Flatwater 30% and Pools 43% (Graph 1). Of the total survey length, Riffles comprised 16%, Flatwater 43% and Pools 38% (Graph 2).

Twenty-two Level IV Habitat Types were identified (Table 2). Of the Level IV Habitat Types, the most frequently occurring were Low Gradient Riffles 21%, Mid Channel Pools 18% and Step Runs 16% (Graph 3). Of the total survey length, Step Runs comprised 32%, Mid Channel Pools 15% and Low Gradient Riffles 12% (Table 2).

Table 3 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Scour pools were most often encountered at 54% occurrence and comprised 57% of the total length of pools.

Table 4 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In CFTW, 690 of the 1,079 pools (64%) had a depth of two feet or greater (Graph 6).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 1,079 pool tail-outs measured in CFTW, 1% had a value of 1, 6% had a value of 2, 24% had a value of 3 and 68% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Riffles had the highest mean shelter rating at 40 (Table 1). Of the Level III Pool Habitat Types, Scour pools had the highest mean shelter rating at 46 (Table 3).

Of the 1,079 pools, 19% were formed by Large Woody Debris: 14% by logs and 5% by root wads (calculated from Table 5).

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 60% had gravel as the dominant substrate type (Graph 8).

Mean percent closed canopy was 84%: 38% coniferous trees and 46% deciduous trees. Mean percent open canopy was 16% (Graph 9, calculated from Table 7).

Mean percent right bank vegetated was 57% while mean percent left bank vegetated was 60%. Deciduous trees occurred most often as bank vegetation at a mean percent of 43 (of units fully measured). Sand/Silt/Clay occurred most often as bank substrate with a mean percent of 58 (of units fully measured) (Table 7).

CLARK FORK TEN MILE RIVER TRIBUTARIES HABITAT INVENTORY RESULTS

The habitat inventory of August 17, 1994 through July 18, 1995, was conducted by Diana Hines, David Lundby and Warren Mitchell. The total length of stream surveyed was 64,444 feet (12.2 miles) (Table 8). Side channels comprised 409 feet of this total.

Table 8 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 25%, Flatwater 31% and Pools 42% (Graph 1). Of the total survey length, Riffles comprised 18%, Flatwater 48% and Pools 28% (Graph 2).

Nineteen Level IV Habitat Types were identified (Table 9). Of the Level IV Habitat Types, the most frequently occurring were Low Gradient Riffles 22%, Mid Channel Pools 19% and Step Runs 16% (Graph 4). Of the total survey length, Step Runs comprised 36% and Low Gradient Riffles 15% (Table 9).

Table 10 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Scour pools were most often encountered at 52% occurrence and comprised 55% of the total length of pools.

Table 11 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In CFTT, 266 of the 607 pools (44%) had a depth of two feet or greater (Graph 6).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 607 pool tail-outs measured in CFTT, 0% had a value of 1, 2% had a value of 2, 15% had a value of 3 and 82% had a value of 4 (Graph 7).

Of the Level II Habitat Types, Pools had the highest mean shelter rating at 37 (Table 8). Of the Level III Pool Habitat Types, Scour pools had the highest mean shelter rating at 44 (Table 10).

Of the 607 pools, 23% were formed by Large Woody Debris: 19% by logs and 4% by root wads (calculated from Table 12).

Table 13 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 74% had gravel as the dominant substrate type (Graph 8).

Mean percent closed canopy was 90%: 48% coniferous trees and 42% deciduous trees. Mean percent open canopy was 10% (Graph 10, calculated from Table 14).

Mean percent right bank vegetated was 61% while mean percent left bank vegetated was 63%. Coniferous trees occurred most often as bank vegetation at a mean percent of 38 (of units fully measured). Sand/Silt/Clay occurred most often as bank substrate with a mean percent of 62 (of units fully measured) (Table 14).

MAINSTEM CLARK FORK TEN MILE RIVER HABITAT INVENTORY RESULTS

The habitat inventory of October 5, 1994 through July 7, 1995, was conducted by Diana Hines, David Lundby and Warren Mitchell. The total length of stream surveyed was 90,413 feet (17.1 miles) (Table 15). Side channels comprised 1,131 feet of this total. A 30 foot waterfall in upper Clark Fork Ten Mile is a barrier to anadromous fish migration resulting in 77,247 feet (14.6 miles) of anadromous fish habitat. The remaining 13,166 feet (2.5 miles) were surveyed as fish bearing habitat due to fish stocking upstream of this waterfall.

Table 15 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 26%, Flatwater 30% and Pools 44% (Graph 1). Of the total survey length, Riffles comprised 16%, Flatwater 40% and Pools 44% (Graph 2).

Twenty-two Level IV Habitat Types were identified (Table 16). Of the Level IV Habitat Types, the most frequently occurring were Low Gradient Riffles 19%, Mid Channel Pools 17% and Step Runs 16% (Graph 5). Of the total survey length, Step Runs comprised 29%, Mid Channel Pools 17% and Lateral Scour Bedrock Pools 13% (Table 16).

Table 17 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Scour pools were most often encountered at 58% occurrence and comprised 58% of the total length of pools.

Table 18 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In CFT, 424 of the 472 pools (90%) had a depth of two feet or greater (Graph 6).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 472 pool tail-outs measured in CFT, 2% had a value of 1, 12% had a value of 2, 31% had a value of 3 and 55% had a value of 4 (Graph 7).

Of the Level II Habitat Types, Riffles had the highest mean shelter rating at 47 (Table 15). Of the Level III Pool Habitat Types, Scour pools had the highest mean shelter rating at 50 (Table 17).

Of the 472 pools, 15% were formed by Large Woody Debris: 8% by logs and 7% by root wads (calculated from Table 19).

Table 20 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 38% had gravel as the dominant substrate type (Graph 8).

Mean percent closed canopy was 76%: 25% coniferous trees and 51% deciduous trees. Mean percent open canopy was 24% (Graph 11, calculated from Table 21).

Mean percent right bank vegetated was 51% while mean percent left bank vegetated was 56%. Deciduous trees occurred most often as bank vegetation at a mean percent of 62 (of units fully measured). Sand/Silt/Clay occurred most often as bank substrate with a mean percent of 51 (of units fully measured) (Table 21).

DISCUSSION

The information gathered from the habitat typing inventory will provide Georgia-Pacific with baseline data on the current condition of the watershed and the available habitat for salmonids. This data will then be used to identify components of the habitat which are in need of enhancement so the appropriate conditions for salmonids can be improved throughout the watershed.

Pool Depth

According to Flosi and Reynolds (1994), a stream with 50% or more of its total habitat comprised of primary pools is generally desirable. Primary pools are at least two feet deep in first and second order streams and at least three feet deep in third and fourth order streams. Although the CFTT had less than 50% primary pools, the CFTW had a high percentage (64%) of primary pools indicating favorable depths for salmonids.

Large Woody Debris

The presence of Large Woody Debris (LWD) in streams is a significant component of fish habitat. Woody debris creates areas of low flow, providing a refuge for fish during periods of high flow (Robison and Beschta, 1990). Woody debris also provides cover for fish, lowering the risk of predation. Due to the problems with Table 5 (see Habitat Typing Inventory Overview), we were unable to determine the mean percents of woody debris as cover. However, we were able to determine the percent of pools formed by LWD. The CFTT had the highest percent (23%) LWD formed pools in the entire watershed with CFT trailing at 15%. Whether these numbers are high or low, relative to the needs of salmonids, is difficult to ascertain since the optimum amount of woody debris in streams has not been specified (Robison and Beschta 1990).

Canopy

There are two important benefits of canopy cover in coastal streams. Canopy keeps stream temperatures cool as well as providing nutrients in the form of leaf litter and organic material (Bilby 1988). Mean percent canopy cover for the CFTW was 84%. This is relatively high since a canopy cover of 80% or higher is considered optimum, Flosi and Reynolds (1994). Mean percent canopy cover in the tributaries was high at 90%. Hobo data confirms that tributaries provide cool water influence to the mainstem; this may be due, in large part, to the higher percentage of canopy in the tributaries. CFT mainstem had a mean canopy cover of 76%.

Deciduous trees occupied a slightly larger portion of the canopy than did coniferous trees. In the CFT, deciduous trees comprised just over 50% of the canopy leaving only 25% deciduous tree canopy. However, the CFTW and CFTT had a more or less equal percents of deciduous and coniferous

canopy. Wood from alder and most other deciduous species deteriorates more rapidly than wood from coniferous species (Sedell, *et al*. 1988). This would leave less LWD in the stream available for fish cover and LWD formed pools.

Substrate

Since salmon generally create redds at the heads of riffles, we were mainly concerned with the dominant substrate in these units. Reiser and Bjornn (1979) reported substrate between .50 and 4.0 inches (1.3 - 10.2 cm) is suitable spawning habitat for Coho. The scale used to determine gravel size in this habitat survey was .08-2.5 inches which was similar to the above range. The majority of the Low Gradient Riffles in the CFTW (60%) had gravel as the dominant substrate. The CFTT had a higher percentage (74%) of riffles with gravel as the dominant substrate than did the CFT (38%). The relatively high presence of gravel in riffles indicates that there is a sufficient amount of substrate available as potential spawning habitat throughout the watershed.

Embeddedness

Though there are sufficient levels of the necessary substrate for spawning habitat, the relatively high embeddedness values found throughout the CFTW could hinder the survival of the eggs deposited in the redds. High silt levels reduce water circulation within the substrate, thus lowering the oxygen levels needed by salmonid eggs (Sandercock, 1991).

Substrate embedded with silt in varying degrees were given corresponding values as follows: 0-25%= value 1, 26 - 50% = value 2, 51 - 75% = value 3 and 76 - 100% = value 4. According to Flosi and Reynolds (1994), creeks with embeddedness values of two or higher are considered to have poor quality fish habitat. In the CFTW, 98% of the pool tail-outs measured had embeddedness values of two or more.

It is important to consider, however, that the above embeddedness values were obtained in the summer during low flow conditions. In winter and spring, flows are usually higher due to the rainy season and the lowered evapotranspiration of the trees. This higher flow probably decreases the amount of fines allowed to settle. As a result, winter and spring flows would yield lower embeddedness values than in the summer.

Overall, the CFTW appears to provide suitable habitats for anadromous salmonids. The CFTW is expected to improve overtime as this river system approaches its natural equilibrium. Georgia-Pacific will attempt to enhance this approach through sound management practices and restoration and enhancement projects.

RECOMMENDATIONS

The CFTW should be managed as an anadromous, natural production watershed.

Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

Mean percents of cover types in pools have not yet been calculated. However, upon completion of these calculations, insufficient woody debris cover types in pools need to be identified and prioritized. Pools lacking in woody debris cover types should be augmented with recruitment of woody debris.

Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediment entering the watershed. In addition, sediment sources related to road systems need to be identified, mapped and treated according to their potential for sediment yield to the watershed.

Increase the canopy in the CFTW by planting willow, alder, redwood and Douglas-fir along the watercourses where shade canopies are not at acceptable levels. Planting efforts need to be coordinated to follow bank stabilization or upslope erosion control projects.

Log debris accumulations retaining large quantities of fine sediment should be modified carefully, over time, to avoid excessive sediment loading in downstream reaches.

D.L.

STREAM INVENTORY REPORT
SOUTH FORK TEN MILE RIVER WATERSHED

WATERSHED OVERVIEW

The South Fork Ten Mile River Watershed (SFTW) is comprised of Mainstem South Fork Ten Mile River (SFT) and its tributaries (SFTT). SFTW elevations range from 20 feet at the mouth to 3,000 feet in the headwater areas and drains approximately 19,620 acres. SFT is a tributary to the Ten Mile River (TMR) with a confluence location of T19N R17W Sec03, 39° 32'23" N. latitude, 123°44'42" W. longitude on the USGS Dutchmans Knoll 7.5 minute quadrangle. In addition to SFT, four Class 1 tributaries were surveyed: Smith Creek, Campbell Creek, Churchman Creek and Redwood Creek. For clarity, habitat inventory results for SFTW, SFT and SFTT are presented separately.

SOUTH FORK TEN MILE RIVER WATERSHED HABITAT INVENTORY RESULTS

The habitat inventory of June 15 through August 16, 1994, was conducted by David Lundby and Warren Mitchell. The total length of stream surveyed was 213,642 feet (40.5 miles) (Table 1). Side channels comprised 3,045 feet of this total.

Table 1 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 24%, Flatwater 33% and Pools 41% (Graph 1). Of the total survey length, Riffles comprised 15%, Flatwater 56% and Pools 25% (Graph 2).

Twenty Level IV Habitat Types were identified (Table 2). Of the Level IV Habitat Types, the most frequently occurring were Low Gradient Riffles 23%, Step Runs 20% and Runs 13% (Graph 3). Of the total survey length, Step Runs comprised 44%, Low Gradient Riffles 14% and Runs 12% (Table 2).

Table 3 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Scour pools were most often encountered at 73% occurrence and comprised 71% of the total length of pools.

Table 4 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In SFTW, 688 of the 1,117 pools (58%) had a depth of two feet or greater (Graph 6).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 1,117 pool tail-outs measured in SFTW, 0% had a value of 1, 0% had a value of 2, 19% had a value of 3 and 81% had a value of 4 (Graph 7).

Of the Level II Habitat Types, Pools had the highest mean shelter rating at 36 (Table 1). Of the Level III Pool Habitat Types, Scour pools had the highest mean shelter rating at 40 (Table 3).

Of the 1,117 pools, 42% were formed by Large Woody Debris: 30% by logs and 12% by root wads (calculated from Table 5).

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 93% had gravel as the dominant substrate type (Graph 8).

Mean percent closed canopy was 81%: 38% coniferous trees and 43% deciduous trees. Mean percent open canopy was 19% (Graph 9, calculated from Table 7).

Mean percent right bank vegetated was 64% while mean percent left bank vegetated was 66%. Deciduous trees occurred most often as bank vegetation at a mean percent of 39 (of units fully measured). Sand/Silt/Clay occurred most often as bank substrate with a mean percent of 90 (of units fully measured) (Table 7).

SOUTH FORK TEN MILE RIVER TRIBUTARIES HABITAT INVENTORY RESULTS

The habitat inventory of July 25 through August 16, 1994, was conducted by David Lundby and Warren Mitchell. The total length of stream surveyed was 102,273 feet (19.4 miles) (Table 8). Side channels comprised 944 feet of this total.

Table 8 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 25%, Flatwater 32% and Pools 40% (Graph 1). Of the total survey length, Riffles comprised 16%, Flatwater 58% and Pools 18% (Graph 2).

Eighteen Level IV Habitat Types were identified (Table 9). Of the Level IV Habitat Types, the most frequently occurring were Low Gradient Riffles 24%, Step Runs 22% and Lateral Scour Log Pools 14% (Graph 4). Of the total survey length, Step Runs comprised 52%, Low Gradient Riffles 15% and Dry Units 7% (Table 9).

Table 10 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Scour pools were most often encountered at 73% occurrence and comprised 71% of the total length of pools.

Table 11 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In SFTT, 260 of the 623 pools (42%) had a depth of two feet or greater (Graph 6).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 623 pool tail-outs measured in SFTT, 0% had a value of 1, 0% had a value of 2, 13% had a value of 3 and 87% had a value of 4 (Graph 7).

Of the Level II Habitat Types, Pools had the highest mean shelter rating at 32 (Table 8). Of the Level III Pool Habitat Types, Scour pools had the highest mean shelter rating at 35 (Table 10).

Of the 623 pools, 47% were formed by Large Woody Debris: 34% by logs and 13% by root wads (calculated from Table 12).

Table 13 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 97% had gravel as the dominant substrate type (Graph 8).

Mean percent closed canopy was 85%: 40% coniferous trees and 45% deciduous trees. Mean percent open canopy was 15% (Graph 10, calculated from Table 14).

Mean percent right bank vegetated was 67% while mean percent left bank vegetated was 69%. Brush occurred most often as bank vegetation at a mean percent of 43 (of units fully measured). Sand/Silt/Clay occurred most often as bank substrate with a mean percent of 95 (of units fully measured) (Table 14).

MAINSTEM SOUTH FORK TEN MILE RIVER HABITAT INVENTORY RESULTS

The habitat inventory of June 15 through July 14, 1994, was conducted by Warren Mitchell and David Lundby. The total length of stream in South Fork Ten Mile River surveyed was 111,369 feet (21.1 miles) (Table 15). Side channels comprised 2,101 feet of this total.

Table 15 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 22%, Flatwater 33% and Pools 43% (Graph 1). Of the total survey length, Riffles comprised 14%, Flatwater 55% and Pools 31% (Graph 2).

Seventeen Level IV Habitat Types were identified (Table 16). Of the Level IV Habitat Types, the most frequently occurring were Low Gradient Riffles 22%, Runs 16% and Mid Channel and Lateral Scour Log Pools 11% each (Graph 5). Of the total survey length, Step Runs comprised 37%, Runs 17 % and Low Gradient Riffles 14% (Table 16).

Table 17 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Scour pools were most often encountered at 73% occurrence and comprised 71% of the total length of pools.

Table 18 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In SFT, 428 of the 554 pools (77%) had a depth of two feet or greater (Graph 6).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 554 pool tail-outs measured, 0% had a value of 1, 0% had a value of 2, 26 had a value of 3 and 74% had a value of 4 (Graph 7).

Of the Level II Habitat Types, Pools had the highest mean shelter rating at 41 (Table 15). Of the Level III Pool Habitat Types, Scour pools had the highest mean shelter rating at 44 (Table 17).

Of the 554 pools, 36% were formed by Large Woody Debris: 24% by logs and 12% by root wads (calculated from Table 19).

Table 20 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 88% had gravel as the dominant substrate (Graph 8).

Mean percent closed canopy was 77%: 36% coniferous trees and 41% deciduous trees. Mean percent open canopy was 23% (Graph 11, calculated from Table 21).

Mean percent right bank vegetated was 60% while mean percent left bank vegetated was 63%. Deciduous trees occurred most often as bank vegetation at a mean percent of 47 (of units fully measured). Sand/Silt/Clay occurred most often as bank substrate with a mean percent of 84 (of units fully measured) (Table 21).

DISCUSSION

The information gathered from the habitat typing inventory will provide Georgia-Pacific with baseline data on the current condition of the watershed and the available habitat for salmonids. This data will then be used to identify components of the habitat which are in need of enhancement so the appropriate conditions for salmonids can be improved throughout the watershed.

Pool Depth

According to Flosi and Reynolds (1994), a stream with 50% or more of its total habitat comprised of primary pools is generally desirable. Primary pools are at least two feet deep in first and second order streams and at least three feet deep in third and fourth order streams. Although the SFTT had less than 50% primary pools, the SFTW had a high percentage (58%) of primary pools indicating favorable depths for salmonids.

Large Woody Debris

The presence of Large Woody Debris (LWD) in streams is a significant component of fish habitat. Woody debris creates areas of low flow, providing a refuge for fish during periods of high flow (Robison and Beschta, 1990). Woody debris also provides cover for fish, lowering the risk of predation. Due to the problems with Table 5 (see Habitat Typing Inventory Overview), we were unable to determine the mean percents of woody debris as cover. However, we were able to determine the percent of pools formed by LWD. The SFTT had the highest percent (47%) LWD formed pools in the entire watershed with SFT trailing at 36%. Whether these numbers are high or low, relative to the needs of salmonids, is difficult to ascertain since the optimum amount of woody debris in streams has not been specified (Robison and Beschta 1990).

Canopy

There are two important benefits of canopy cover in coastal streams. Canopy keeps stream temperatures cool as well as providing nutrients in the form of leaf litter and organic material (Bilby 1988). Mean percent canopy cover for the SFTW was 81%. A canopy cover of 80% or higher is considered optimum, Flosi and Reynolds (1994). Mean percent canopy cover in the tributaries was higher at 85%. Hobo data confirms that tributaries provide cool water influence to the mainstem; this may be due, in large part, to the higher percentage of canopy in the tributaries. The SFT had a mean canopy cover of 77%.

The SFTW, had a more or less equal percents of deciduous and coniferous canopy. Wood from alder and most other deciduous species deteriorates more rapidly than wood from coniferous species (Sedell, *et al*. 1988). This would leave less LWD in the stream available for fish cover and LWD formed pools.

Substrate

Since salmon generally create redds at the heads of riffles, we were mainly concerned with the dominant substrate in these units. Reiser and Bjornn (1979) reported substrate between .50 and 4.0 inches (1.3 - 10.2 cm) is suitable spawning habitat for Coho. The scale used to determine gravel size in this habitat survey was .08-2.5 inches which was similar to the above range. The majority of the Low Gradient Riffles in the SFTW (93%) had gravel as the dominant substrate. The SFTT had a higher percentage (97%) of riffles with gravel as the dominant substrate than did the SFT (88%). The high

presence of gravel in riffles indicates that there is a sufficient amount of substrate available as potential spawning habitat throughout the watershed.

Embeddedness

Though there are sufficient levels of the necessary substrate for spawning habitat, the high embeddedness values found throughout the SFTW could hinder the survival of the eggs deposited in the redds. High silt levels reduce water circulation within the substrate, thus lowering the oxygen levels needed by salmonid eggs (Sandercock, 1991).

Substrate embedded with silt in varying degrees were given corresponding values as follows: 0-25%= value 1, 26 - 50% = value 2, 51 - 75% = value 3 and 76 - 100% = value 4. According to Flosi and Reynolds (1994), creeks with embeddedness values of two or higher are considered to have poor quality fish habitat. In the SFTW, 100% of the pool tail-outs measured had embeddedness values of two or more.

It is important to consider, however, that the above embeddedness values were obtained in the summer during low flow conditions. In winter and spring, flows are usually higher due to the rainy season and the lowered evapotranspiration of the trees. This higher flow probably decreases the amount of fines allowed to settle. As a result, winter and spring flows would yield lower embeddedness values than in the summer.

Overall, the SFTW appears to provide suitable habitats for anadromous salmonids. The SFTW is expected to improve overtime as this river system approaches its natural equilibrium. Georgia-Pacific will attempt to enhance this approach through sound management practices and restoration and enhancement projects.

RECOMMENDATIONS

The SFTW should be managed as an anadromous, natural production watershed.

Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

Mean percents of cover types in pools have not yet been calculated. However, upon completion of these calculations, insufficient woody debris cover types in pools need to be identified and prioritized. Pools lacking in woody debris cover types should be augmented with recruitment of woody debris.

Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediment entering the watershed. In addition, sediment sources related to road systems need to be identified, mapped and treated according to their potential for sediment yield to the watershed.

Increase the canopy in the SFTW by planting willow, alder, redwood and Douglas fir along the watercourses where shade canopies are not at acceptable levels. Planting efforts need to be coordinated to follow bank stabilization or upslope erosion control projects.

Log debris accumulations retaining large quantities of fine sediment should be modified carefully, over time, to avoid excessive sediment loading in downstream reaches.

D.L.

SECTION 3

STREAM INVENTORY REPORTS

TEN MILE RIVER WATERSHED

STREAM INVENTORY REPORT
NORTH FORK TEN MILE

WATERSHED OVERVIEW

North Fork Ten Mile is a tributary to the Ten Mile River. Elevations range from about 40 feet at the mouth of the creek to 2,200 feet in the headwater areas. North Fork Ten Mile's legal description at the confluence with the Ten Mile River is T20N R17W Sec25. Its location is 39° 33'53"N. latitude and 123°42'30"W longitude according to the USGS Sherwood Peak 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of September 13, through October 2, 1995, was conducted by Diana Hines and David Lundby. The total length of stream in North Fork Ten Mile surveyed was 83,424 feet (16.0 miles) with an additional 1,299 feet of side channels (Table 1). Flow measured at the mouth of North Fork Ten Mile on 9/13/95 was 4.011 cubic feet per second (cfs).

North Fork Ten Mile is comprised of two reaches; reach one is a B4 channel type for the first 43,613 feet while reach two, a B2 channel type, makes up the remaining 38,999 feet.

Table 1 summarizes the Level II Riffle, Flatwater, and Pool habitat types. By percent occurrence, Riffles comprised 23%, Flatwater 33% and Pools 45% of the habitat types (Graph 1). By percent total length, Riffles comprised 16%, Flatwater 37% and Pools 47% (Graph 2).

Eighteen Level IV Habitat Types were identified in North Fork Ten Mile. The data are summarized in Table 2. The most frequently occurring habitat types were Low Gradient Riffles 21%, Mid Channel Pools 18% and Runs 15% (Graph 3). The most prevalent habitat types by percent total length were Mid Channel Pools 18% Low Gradient Riffles 15% and Lateral Scour Bedrock Pools as well as Glides, each at 14% (Table 2).

Table 3 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Scour Pools were most often encountered at 57% occurrence and comprised 60% of the total length of pools.

Table 4 is a summary of maximum pool depths by pool habitat types. Pools with depths of two feet or greater are considered optimal for fish habitat. In North Fork Ten Mile, 415 of the 497 pools (84%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 497 pool tail-outs measured, 2% had a value of 1, 9% had a value of 2, 16% had a value of 3 and 72% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Pools had the highest mean shelter rating at 36 (Table 1). Of the Level III Pool Types, Scour Pools had the highest mean shelter rating at 40 (Table 3).

Of the 497 Pools, 19% were formed by Large Woody Debris, 8% by logs and 11% by root wads (calculated from Table 4).

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles measured, 63% had gravel as the dominant substrate (Graph 6).

Mean percent closed canopy was 70%: 15% coniferous trees and 55% deciduous trees. Mean percent open was 30% (Graph 7).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. The mean percent right bank vegetated in North Fork Ten Mile was 64% while the mean percent left bank vegetated was 66%. Deciduous trees were the dominant bank vegetation type observed in 81% of the units fully measured. Coniferous trees were dominant in 12% of the units fully measured. The dominant substrate composing the structure of the stream banks was Sand/Silt/Clay, found in 58% of the units fully measured.

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

417 five redds observed
937 Clark Fork bridge crossing
1541 5 redds
1641 three redds observed
2347 8 redds observed
2931 left bank failure (15' x 40') fines
3260 LWD on left bank 70' x 40' x 9'
3345 3 redds observed
3709 8 redds
4148 2 redds
4322 big pool
5808 7 redds, trib entering left bank at 25'
7449 6 redds observed in tail
7782 3 redds
8407 large root wad enhancing scour
8771 1 redd in tail
9032 5 redds here
10395 large root wad on right bank enhancing scour
10714 6 redds in tail
11294 deep hole is the water truck spot
11392 Little North Fork enters right bank at 0'
11649 2 redds in tail of pool
13027 8 redds in tail
13295 4 redds in tail
14028 4 redds in tail

14380 5 redds in tail
14479 redds in tail
14630 2 redds in tail
14660 3 redds in middle of unit
14912 enormous root wad, 4 redds in tail
15156 10 redds in unit
15299 scour caused by large and small woody debris accumulation
15803 6 redds
16449 site of old creek crossing (wet) no bridge
16583 15 redds observed
16715 three redds
16838 RBA site NFT # 2
16952 9 redds here in tail, hobo temp site
16999 trib enters right bank at 0'
17418 10 redds here in tail
18337 3 redds in tail
18521 4 redds in tail
18905 recent cat Crossing in old wet Crossing 225'
19231 4 redds in tail
19327 3 redds in tail
19886 2 redds, right bank failure 50' x 40' (L x H), attempt to reinforce with boulders - road in jeopardy
21371 road is about 10 linear feet from creek but about 20' above it
21516 4 redds in tail
21604 5 redds in tail
21908 bank failure left bank
21985 major left bank failure, fines
22233 1 western toad, adult
22426 1 sharp tailed snake, 3 redds
22796 two redds
22915 4 redds
23154 10 redds in long tail
23291 5 redds in unit
23771 3 redds in tail
23827 1 redd in tail
24633 4 redds
25737 5 redds
26536 trestle (RR Crossing)
26752 4 redds
27313 bank failure, left bank

27835 3-4 redds
29341 king fisher observed
29642 main road bridge here, 2 redds here
30288 2 redds
31202 second main road bridge
31965 3 redds
32221 2 redds- big undercut bank - 4'
32540 right bank buttressed with LWD approximately 60 -70 yrs old, still holding
32648 this pool is complex, scours associated with boulders, log, bedrock. hobo temp pool, 4 redds in tail
32873 3 redds in tail
33597 2 redds in tail
33785 3 redds here
33927 5 redds here, small seep on left bank - great STS salamander site
34228 O'Conner enters right bank at 40'
34574 seep enters left bank at 79', good STS salamander site
34802 4 redds in here
35061 3 redds here
36539 4 redds in tail. tributary enters left bank at 60', possible STS site
36986 8 redds here
37273 one redd in tail
37591 seep entering left bank at 82'
37770 2 redds here
37958 one redd
38215 2 dippers - 7 redds, excellent pool
38520 seep entering left bank at 82'
38637 trib entering right bank at 119'
38880 2 redds here
39075 one redd
39249 6 redds in tail
39702 excellent pool for fish, logs, bedrock ledges, root wads
39884 trib entering left bank at 15', yet another good STS site
40261 3 redds in tail
40513 5 redds at tail
41600 6 redds in tail
42198 7 redds - confluence with bald hill creek on right bank
43210 5 redds in tail
43251 small trib entering left bank at 41' - good SSTs site
44041 8 redds in tail
44419 channel type here

44944 trib enters right bank at tail of pool
45184 one redd at tail
45215 left bank failure contributing fines (40'l x 50'h)
45292 9 redds
45802 4 redds here
45921 12 redds in tail
45965 1 redd
47302 4 redds
48718 8 redds
50194 4 redds
50589 13 redds
51058 3 redds
51470 5 redds in tail
51712 10 redds in tail
51939 2 redds here
52169 3 redds in tail
52655 9 redds in tail
52820 3 redds
53635 gulch 8 entering right bank at 152'
54232 4 redds
54429 4 redds
55432 6 redds here
55510 3 redds
55645 6 redds here
56095 7 redds
56330 7 redds
57242 trib entering left bank at 38'
57772 these units are about 10' from road but about 30 below it
58759 gulch 11 entering right bank at 53'
59835 2 redds
60549 trib entering left bank at 47'
60994 one redd
61087 bullfrog
61293 3 redds
62700 5 - 6 redds
62819 4 redds
63596 3 redds
64044 3 redds
64428 3 redds
65032 trib entering left bank at 28' - good STS site

65660 2 redds
66660 very big pool 120' x 70', mixed left scour and mid channel pool
68633 wood bridge 50' H 81' -115'
68828 trib entering left bank at 19'
68881 gulch 19 enters right bank at 38'
69653 2 redds in tail
69690 2 redds in tail
69952 trib entering left bank at 125'
70122 3 redds
70518 2 redds
71104 6 redds
71175 left bank failure fines 80' x 15'
71907 4 redds
71952 RBA site NFTM # 5
72044 hobo site
72154 10 redds scattered
72580 5 redds
72811 Patsy enters left bank at 36'
73197 bull frog observed, bridge crossing 13' - 36'
73435 5 redds observed in tail
75327 3 redds
75527 bull frog
75672 4 redds in tail
76030 4 redds in tail
76282 left bank failure, fines and redwood tree in creek
76401 3 redds in tail
77855 4 redds in tail
77966 6 redds in unit
78588 6 redds
78622 4 redds
78957 3 redds in unit
79821 trib entering right bank at 74', fish present
80019 5 redds, hobo temp pool, NFT #9
80479 4 redds in tail
80867 trib at 59' right bank
81448 dry trib at 10' left bank
82778 trib enters left bank at 62'
83165 END OF SURVEY - G.P. property line - Standley Creek enters left bank here

D.I.H.

STREAM INVENTORY REPORT

MILL CREEK

WATERSHED OVERVIEW

Mill Creek is a tributary to the Ten Mile River located in Mendocino County, California. Elevations range from about 40 feet at the mouth of the creek to 1,600 feet in the headwater areas. Mill Creek's legal description at the confluence with the Ten Mile River is T20N R17W Sec34. Its location is 39° 32'53" N. latitude and 123°43'2" W. longitude according to the USGS Dutchmans Knoll 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of June 14 through June 15, 1994, was conducted by Warren Mitchell and David Lundby. The total length of stream in Mill Creek surveyed was 9,606 feet (1.8 miles) (Table 1). There were no side channels in this creek.

Mill Creek is comprised of two reaches: F4 for the first 6,127 feet and B4 for the remaining 3,479 feet.

Table 1 summarizes the Level II Riffle, Flatwater and Pool Habitat Types. By percent occurrence, Riffles comprised 33%, Flatwater 35% and Pools 31% of the habitat types in Mill Creek (Graph 1). By percent total length, Riffles comprised 28%, Flatwater 55% and Pools 10% (Graph 2).

Thirteen Level IV Habitat Types were identified in Mill Creek. The data are summarized in Table 2. The most frequently occurring habitat types were Low Gradient Riffles 28%, Step Runs 24% and Runs 11% (Graph 3). The most prevalent habitat types by percent total length were Step Runs 49%, Low Gradient Riffles 24% and Runs 6% (Table 2).

Table 3 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Scour Pools were most often encountered at 82% and comprised 80% of the total length of pools.

Table 4 is a summary of maximum pool depths by pool habitat types. Pools with depths of two feet or greater are considered optimal for fish habitat. In Mill Creek, 10 of the 50 Pools (20%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 49 pool tail-outs measured, there were none with values of 1 or 2, 70% had a value of 3 and 30% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Pool habitat types had the highest mean shelter rating in Mill Creek at 44 (Table 1). Of the Level III Pool Types in Mill Creek, Scour Pools had the highest mean shelter rating at 56 (Table 3).

Of the 50 pools in Mill Creek, 40% were formed by Large Woody Debris: 30% by logs and 10% by root wads (calculated from table 4).

Table 6 summarizes the dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles measured, 100% had gravel as the dominant substrate (Graph 6).

Mean percent closed canopy was 97%: 10% coniferous trees and 87% deciduous trees. Mean open was 3% (Graph 7).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. The mean percent right bank vegetated was 87% while the mean percent left bank vegetated was 91%. Brush was the dominant bank vegetation type observed in 88% of the units fully measured. Coniferous trees were dominant in 2% of units fully measured. The dominant substrate comprising the structure of the stream banks consisted of Sand/Silt/Clay, found in 100% of the units fully measured.

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

120 confluence with bull creek. wetted channel 2.5'w. bank full is 23'w good spawning gravel present. walking bridge 45'w x 5'l x 4.5'h, in bad shape.
642 right bank dominant type is dead conifers. horse trail crossing through stream
780 good spawning gravel.
826 bank erosion right bank, small shale, 15'h x 35'l.
1054 bare soil slide on right bank 40'l x 50'h. some cover but contributing fines.
1170 right bank loose gravel and sand, 12'h x 50'l. good spawning gravel at tail. young of year observed.
1268 dry tributary on left bank. left bank erosion with bare soil and roots, 11'h x 45'l.
8/22/85 CCC flag site #2
1357 right bank dominant type is dead conifers.
1519 dry overflow channel causing small bank erosion to right bank, 15'h x 20'l.
1559 dry tributary on left bank. left and right bank dominant type is dead conifers.
1654 LWD on left bank is the dominant type 20'l x 5'h x 15'w..
1674 small woody debris accumulation 10'w x 3'l x 2'h. left bank dominant type is dead conifers.
1732 downed redwood log 2’ diameter. x 35' on bottom of right bank. holds part of right bank.
1954 lots of young of year observed and 1+. 2' step in unit. logs on both banks.
1977 4' undercut right bank. deciduous root wad causes pool and undercut on right bank.
2078 right bank row of alders with vertical bank of soil held together by roots.
2095 left bank alders grow in between boulders piled on alders.
2181 young of year observed and 1+

2524 large root wad redwood on right bank being undercut. tributary off left bank 2'w, is dammed up. dry undercut left bank, undercut 2 large redwood trees, root masses are hanging down. 10 metal pipes on left bank and in water. right bank changes last 25% of unit into boulder, vertical 6'h then slope with deciduous and conifer trees, 30'l section. live deciduous tree has fallen across channel 3' above water and continues to grow. 10 redwood logs embedded into right bank 50'l x 4'h. trees growing out of logs.

2606 small pool in channel 3 x 3 x 1.5 deep. dry overflow channel on right bank.

2824 2 redwood logs fallen across channel catching SWD 20 x 6 x 5 . 6 logs for use. young of year observed. 5 logs fallen across channel 10' above water. land slide right bank 35 x 15'h. consists of small trees and boulders. left clearing on bank 70' x 20'.

2851 young of year observed. several redwood logs and two large stumps hold left bank together and are the dominant type.

2991 2 fallen redwood logs on right bank, one is embedded. dry tributary on right bank

3120 2 fallen logs in water accumulating SWD.

3207 channel change.

3439 gravel retention 7 x 3.

3511 erosion on right bank 10 x 10 and left bank 20 x 8 with contributing fines and boulders.

3708 young of year observed. SWD accumulation 15' x 10' x 4' off left bank.

3753 fork of creek. right is the tributary, small trickle of water due to large log jam. 2'w slow water. left bank, bare soil, bank failure 30’l x 15'h contributing boulders, cobbles and fines.

4003 3 Pools among cascade with mean depth of 1.3’. cascade is approximately 40' change in height over 250’. very steep plunges. END OF SURVEY.

D.I.H.

STREAM INVENTORY REPORT
LITTLE NORTH FORK TEN MILE

WATERSHED OVERVIEW

Little North Fork Ten Mile (LNFT) is a tributary to the North Fork Ten Mile River located in Mendocino County, California. Elevations range from about 280 feet at the mouth of the creek to 1,500 feet in the headwater areas. Little North Fork Ten Mile's legal description at the confluence with the North Fork Ten Mile River is T20N R17W Sec13. Its location is 39°35'38" N. latitude and 123°42'48" W. longitude according to the USGS Dutchmans Knoll 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of August 9, through August 15, 1995, was conducted by Diana Hines and David Lundby. The total length of stream surveyed was 21,422 feet (4.1 miles) including 62 feet of side channels (Table 1). Flow measured at the mouth of Little North Fork Ten Mile on 8/4/95 was 2.45 cubic feet per second (cfs).

Little North Fork Ten Mile is comprised of three reaches: reach one is a C4 channel type for the first 14,578 feet, reach two is a B3 channel type for the next 3,990 feet and reach three is an F4 channel type for the remaining 2,854 feet of creek.

Table 1 summarizes the Level II Riffle, Flatwater, and Pool Habitat Types. By percent occurrence, Riffles comprised 20%, Flatwater 29% and Pools 51% of the habitat types (Graph 1). By percent total length, Riffles comprised 15%, Flatwater 41% and Pools 44% (Graph 2).

Eighteen Level IV Habitat Types were identified in Little North Fork Ten Mile. These data are summarized in Table 2. The most frequently occurring habitat types were Low Gradient Riffles 19%, Mid Channel Pools 18% and both Runs and Step Runs at 14% (Graph 3). The most prevalent habitat types by percent total length were Step Runs 27%, Low Gradient Riffles 15% and Mid Channel Pools also at 15% (Table 2).

Table 3 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Scour Pools were most often encountered at 59% occurrence and comprised 61% of the total length of pools.

Table 4 is a summary of maximum pool depths by pool habitat types. Pools with depths of two feet or greater are considered optimal for fish habitat. In Little North Fork Ten Mile, 131 of the 292 pools (45%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 288 pool tail-outs measured, 0% had a value of 1, 0% had a value of 2, 17% had a value of 3 and 83% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Pool habitat types had the highest mean shelter rating at 44. (Table 1). Of the Level III Pool Types, Scour pools had the highest mean shelter rating at 46 (Table 3).

Of the 292 pools, 40% were formed by Large Woody Debris: 23% by logs and 17% by root wads (calculated from Table 4).

Table 6 summarizes the dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles measured, 100% had gravel as the dominant substrate (Graph 6).

Mean percent closed canopy was 90%: 39% coniferous trees and 51% deciduous trees. Mean percent open was 10% (Graph 7).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. The mean percent right and left banks vegetated were each 80%. Grass was the dominant bank vegetation type observed in 34% of the units fully measured. Coniferous and deciduous trees were dominant bank vegetation types in 30% and 32% of the units fully measured. The dominant substrate composing the structure of the stream banks was Sand/Silt/Clay, found in 89% of the units fully measured.

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

174 bridge crossing here
869 RBA site LNFT # 1
2206 confluence with Buckhorn
2960 low road crossing with 3' culvert at 36'
3005 channel type here
3694 log jam over center 3'h x 20' w x 10'l
4660 log jam at top of unit 6'h x 7'w x 15'l
5180 log jam LWD 5' x 28' x 30'
7706 road crossing from 7' to 27'
8697 unit covered by LWD jam, 35'w x 6'h x 12'l
9361 trib entering right bank at 49'
10249 was restored to a plunge (log) pool but has failed - main scour is now under log
10307 confluence with Barlow gulch
10388 undercut root wad of 3' x 10'long
10619 pool with LWD jam - lwh 17' x 32'x 5' - right bank failure contributing fines
10811 right bank failure at 167' (treefall)
10859 lots of silt here
10890 windfalls - fir, alder and Doug fir - about 3' - 6' above creek
11084 slide above on left bank contributing gravel/cobble
11808 at 28' confluence with Blair
12834 hobo temp site
12891 RBA site LNFT #2
14474 trib entering left bank

14649 road crossing here
14697 channel type here
15323 trib entering left bank at 0'
16193 trib at 19' entering right bank
17435 confluence with McGuire Creek
18476 trib entering here
18795 channel type here
19071 major windfall area, tanoaks across creek
19679 trib from right bank at 195'
20589 channel is periodically choked with LWD jams and groups of SWD - also that rusty bacteria is beginning to fill entire channel
20625 7' plunge
21422 END OF ANADROMY, END OF SURVEY - Miller dam, 30' drop

D.I.H.

STREAM INVENTORY REPORT
LITTLE NORTH FORK TEN MILE WATERSHED

WATERSHED OVERVIEW

Little North Fork Ten Mile River is a tributary to the North Fork Ten Mile River, located in Mendocino County, California. Little North Fork Ten Mile has four surveyed Class one tributaries flowing into it: Blair Gulch, Barlow Gulch, Buckhorn Creek and McGuire Creek. Little North Fork Ten Mile's legal description at the confluence with the North Fork Ten Mile River is T20N R17W Sec13. Its location is 39°35'38" N. latitude and 123°42'48" W. longitude, according to the USGS Dutchmans Knoll 7.5 minute quadrangle. Elevations range from about 280 feet at the mouth of the creek to 1,500 feet in the headwater areas.

HABITAT INVENTORY RESULTS

The results from LNFT and its four surveyed tributaries, are presented as the Little North Fork Ten Mile watershed unless otherwise stated. The total length of stream surveyed in the Little North Fork Ten Mile watershed was 53,035 feet (10.0 miles) (Table 1).

Table 1 summarizes the Level II riffle, Flatwater, and Pool Habitat Types. By percent occurrence, Habitat Types consisted of 24% Riffles, 31% Flatwater and 42 % Pools (Graph 1). By percent total length, Habitat Types consisted of 17% Riffles, 47% Flatwater and 26% Pools (Graph 2).

Twenty-one Level IV Habitat Types were identified. These data are summarized in Table 2. The habitat units occurring most frequently were Low Gradient Riffles at 23%, followed by Mid Channel Pools at 21% and Step Runs at 17% (Graph 3). The most prevalent habitat types by percent total length were Step Runs at 37%, followed by Low Gradient Riffles at 17% and Mid Channel Pools at 11%.

Table 3 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Main Pools were most often encountered at 52% occurrence and comprised 45% of the total length of Pools.

Table 4 is a summary of maximum pool depths by Pool Habitat Types. Pools with a depth of two feet or greater are considered optimal for fish habitat. In the Little North Fork Ten Mile watershed, 199 of the 589 pools (34%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the pool tail-outs measured, there were none with values of 1 or 2, only 12% had a value of 3 and 88% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Pools had the highest mean shelter rating at 42 (Table 1). Of the Level III Pool Types, Backwater Pools had the highest mean shelter rating at 49 (Table 3).

Of the 589 Pools, 23% were formed by Large Woody Debris: 14% by logs and 9% by root wads (calculated from Table 4).

Table 6 summarizes the dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles measured, 100% had gravel as the dominant substrate (Graph 6).

Mean percent closed canopy was 93%: 44% coniferous trees and 49% deciduous trees. Mean percent open was 7% (Graph 7).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. The mean percent right bank vegetated was 69% while the mean percent left bank vegetated was 67%. Grass was the dominant bank vegetation type observed in 49% of the units fully measured. Additionally, 31% of the units had coniferous trees as the dominant bank vegetation and 17% had deciduous trees as the dominant bank vegetation, including downed trees, logs, and root wads. The dominant substrate composing the structure of the stream banks was Sand/Silt/Clay, found in 89% of the units fully measured.

D.I.H.

STREAM INVENTORY REPORT
BLAIR GULCH WATERSHED

WATERSHED OVERVIEW

Blair Gulch is a tributary to the Little North Fork Ten Mile River (LNFT), located in Mendocino County, California. Blair Gulch has one surveyed tributary flowing into it, West Blair Gulch. Blair Gulch's legal description at the confluence with LNFT is T20N R17W Sec10. Its location is 39°36'27" N. latitude and 123°43'20" W. longitude, according to the USGS Dutchmans Knoll 7.5 minute quadrangle. Elevations range from about 200 feet at the mouth of the creek to 1,000 feet in the headwater areas.

HABITAT INVENTORY RESULTS

The habitat inventory of July 26, through July 27 1995, was conducted by Diana Hines and David Lundby. The results from Blair Gulch and its tributary, West Blair Gulch, are presented as the Blair Gulch Watershed unless otherwise stated. The total length of stream in Blair Gulch surveyed was 4,378 feet. The total length surveyed in West Blair Gulch was 858 feet, with a total length of 5,236 feet (1.0 miles) of stream surveyed in the Blair Gulch Watershed (Table 1). Their were no side channels in this watershed.

Flow measured at the mouth of Blair Gulch on 8/4/95 was .212 cubic feet per second (cfs) while West Blair Gulch had a flow of .067 cfs.

Blair Gulch is comprised of one reach for the entire 4,378 feet of creek and is a F4 channel type. West Blair Gulch is also comprised of one reach and is also an F4 channel type for the entire 858 feet of creek.

Table 1 summarizes the Level II riffle, Flatwater, and Pool Habitat Types. By percent occurrence, habitat types in the Blair Gulch Watershed consisted of 22% Riffles, 38% Flatwater and 37 % Pools (Graph 1). By percent total length, habitat types in the Blair Gulch Watershed consisted of 15% Riffles, 59% Flatwater and 19% Pools (Graph 2).

Ten Level IV Habitat Types were identified in the Blair Gulch Watershed. These data are summarized in Table 2. Of these, Mid Channel Pools had the highest frequency at 27%, followed by Step Runs at 24% and low gradient Riffles at 22%. (Graph 3). The most prevalent habitat types by percent total length were Step Runs at 51%, followed by low gradient Riffles at 15% and Mid Channel Pools at 14%.

Table 3 summarizes main, Scour and Backwater Pools which are Level III Pool Types. Main Pools were most often encountered at 75% occurrence and comprised 72% of the total length of pools.

Table 4 is a summary of maximum pool depths by pool habitat types. Pools with a depth of two feet or greater are considered optimal for fish habitat. In the Blair Gulch Watershed, 24 of the 72 pools (33%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the pool tail-outs measured, there were none with values of 1 or 2, only 1% had a value of 3 and 99% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Pools had the highest mean shelter rating at 42 (Table 1). Of the Level III Pool Types, Main Pools had the highest mean shelter rating at 46 (Table 3).

Of the 72 Pools, 5% were formed by Large Woody Debris: 5% by logs and 0% by root wads (calculated from Table 4).

Table 6 summarizes the dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles measured, 100% had gravel as the dominant substrate (Graph 6).

Mean percent closed canopy for the Blair Gulch watershed was 100 %: 46% coniferous trees and 54% deciduous trees (Graph 7).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. Mean percent right bank vegetated was 54% while the mean percent left bank vegetated was 53%. Grass was the dominant vegetation type observed in 68% of the units fully measured. Additionally, 32% of the units had coniferous trees as the dominant bank vegetation, including downed trees, logs, and root wads. The dominant substrate composing the structure of the stream banks was Sand/Silt/Clay, found in 88% of the units fully measured.

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

Mainstem Blair Gulch:

257 water flow under culvert below road, culvert 30'l x 3'h
399 channel type done here
1044 possible coho observed
2294 bank failure along right bank contributing gravel and sand
3489 end of this unit, creek splits into equal channels, we took the north fork
3701 large log jam over pool 30'l x 12'w x 14'h
3952 bank failure along right bank 40'l x 12'h
4275 dry tributary enters left bank at 22'
4378 END OF ANADROMY; END OF SURVEY; Culvert (30’ long) blocked, road is 18' above stream. Bank failure on other end road blocking culvert. Fish were not observed for last 200'. Ocular survey above road done, no fish observed. A 30’ long culvert enters pool 3' up from stream at road crossing.

West Blair Gulch:

292 Old road crossing at this unit

858 END OF SURVEY. Stream splits into two equal channels approaching class three streams. Highly entrenched, highly embedded. No suitable habitat for fish, no fish observed throughout this reach.

D.I.H.

STREAM INVENTORY REPORT
BARLOW GULCH

WATERSHED OVERVIEW

Barlow Gulch is a tributary to the Little North Fork Ten Mile River (LNFT) located in Mendocino County, California. Elevations range from about 200 feet at the mouth of the creek to 1000 feet in the headwater areas. Barlow Gulch's legal description at the confluence with LNFT is T20N R17W Sec15. Its location is 39° 36'11" N. latitude and 123°43'52" W. longitude according to the USGS Dutchmans Knoll 7.5 minute quadrangle

HABITAT INVENTORY RESULTS

The habitat inventory of July 31, 1995, was conducted by Diana Hines and David Lundby. The total length of stream in Barlow Gulch surveyed was 3,633 feet (.69 miles). There were no side channels in this creek (Table 1). Flow measured at the mouth of Barlow Gulch on 8/4/95 was .198 cubic feet per second (cfs).

Barlow Gulch is comprised of one reach for the entire 3,633 feet of creek and is a F4 channel type.

Table 1 summarizes the Level II Riffle, Flatwater, and Pool habitat types. By percent occurrence, Riffles comprised 33%, Flatwater 27% and Pools 33% of the habitat types in Barlow Gulch (Graph 1). By percent total length, Riffles comprised 17%, Flatwater 34% and Pools 11% (Graph 2).

Ten Level IV Habitat Types were identified in Barlow Gulch. The data are summarized in Table 2. The most frequently occurring habitat types in Barlow Gulch were Low Gradient Riffles 29%, Mid Channel Pools 23% and Step Runs 19% (Graph 3). The most prevalent habitat types by percent total length were Dry units 38%, Step Runs 30% and Low Gradient Riffles 16%.

Table 3 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Main pools were most often encountered at 72% occurrence and comprised 73% of the total length of pools.

Table 4 is a summary of maximum pool depths by pool habitat types. Pools with depths of two feet or greater are considered optimal for fish habitat. In Barlow Gulch, 1 of the 32 pools (3%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 31 pool tail-outs measured, 100% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Flatwater habitat types had the highest mean shelter rating in Barlow Gulch at 29 (Table 1). Of the Level III Pool Types, Main pools had the highest mean shelter rating at 28 (Table 3).

Of the 32 pools, 6% were formed by Large Woody Debris: 6% by logs and none by root wads (calculated from Table 4).

Table 6 summarizes the dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles measured, 100% had gravel as the dominant substrate (Graph 6).

Mean percent closed canopy was 99%: 48% coniferous trees and 51% deciduous trees. Mean percent open was 1% (Graph 7).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. The mean percent right bank vegetated was 76% while the mean percent left bank vegetated was 70%. Grass was the dominant bank vegetation type observed in 82% of the units fully measured. Coniferous and Deciduous trees were dominant in 8% and 11% of the units fully measured. The dominant substrate composing the structure of the stream banks consisted of Sand/Silt/Clay, found in 87% of the units fully measured.

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

42	unit under road
57	unit under road
190	channel type done here
755	bank failure on left bank
1763	dry tributary entering right
3530	log jam over creek 15'H x 15'W x30'L
3613	END OF SURVEY; channel highly entrenched, highly embedded, no fish observed during entire survey. no suitable habitat for spawning, A4 channel type. Ocular survey for approximately 400' upstream - channel becomes increasingly entrenched and covered with debris (LWD, SWD) still embedded, still no fish.

D.I.H.

STREAM INVENTORY REPORT
BUCKHORN CREEK

WATERSHED OVERVIEW

Buckhorn Creek is a tributary to the Little North Fork Ten Mile River (LNFT). Elevations range from about 120 feet at the mouth of the creek to 1800 feet in the headwater area. Buckhorn Creek's legal description at the confluence with the LNFT is T20N R17W Sec14. Its location is 39° 35'41" N. latitude and 123°42'42" W. longitude according to the USGS Dutchmans Knoll 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of July 31, through August 2, 1995, was conducted by Diana Hines and David Lundby. The total length of stream in Buckhorn Creek surveyed was 11,390 feet (2.4 miles), including 1,403 feet of side channels (Table 1). Flow measured at the mouth of Buckhorn Creek on 8/4/95 was .73 cubic feet per second (cfs).

Buckhorn Creek is comprised of two reaches; reach one is a F4 channel type for the first 11,121 feet and reach two is a B3 channel type for the remaining 269 ft of the creek.

Table 1 summarizes the Level II Riffle, Flatwater, and Pool Habitat Types. By percent occurrence, Riffles comprised 31%, Flatwater 34% and Pools 32% of the habitat types in Buckhorn Creek (Graph 1). By percent total length, Riffle comprised 25%, Flatwater 49% and Pools 11% (Graph 2).

Twelve Level IV Habitat Types were identified in Buckhorn Creek. The data are summarized in Table 2. The most frequently occurring habitat types were Low Gradient Riffles 30%; Mid Channel Pools 22% and Step Runs 17% (Graph 3). The most prevalent habitat types by percent total length were Step Runs 37%, Low Gradient Riffles 24% and Dry units 15% (Table 2).

Table 3 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Main pools were most often encountered at 68% occurrence and comprised 73% of the total length of pools in Buckhorn Creek.

Table 4 is a summary of maximum pool depths by pool habitat types. Pools with depths of two feet or greater are considered optimal for fish habitat. In Buckhorn Creek, 21 of the 92 pools (23%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 90 pool tail-outs measured, 0% had a value of 1, 0% had a value of 2, 7% had a value of 3 and 93% had a value of 4 (Graph 5).

Of the Level II Habitat Types, pool habitat types had the highest mean shelter rating in Buckhorn Creek at 48 (Table 1). Of the Level III Pool Types in Buckhorn Creek, Backwater pools had the highest mean shelter rating at 120 (Table 3).

Of the 92 pools in Buckhorn Creek, 3% were formed by Large Woody Debris: 3% by logs and none by root wads (calculated from Table 4).

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles measured, 100% had Gravel as the dominant substrate (Graph 6).

Mean percent closed canopy for Buckhorn Creek was 93%: 52% coniferous trees and 41% deciduous trees. Mean percent open was 7% (Graph 7).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. The mean percent right bank vegetated in Buckhorn Creek was 59% while the mean percent left bank vegetated was 58%. Grass was the dominant bank vegetation type observed in 72% of the units fully measured. Additionally, 27% of the units had coniferous trees as the dominant bank vegetation type. The dominant substrate composing the structure of the stream banks was Sand/Silt/Clay, found in 83% of the units fully measured.

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

122 channel type here
161 log jam over pool 3'Hx8'Wx10'L
228 log jam over pool 3'h x 10'w x 12'l
493 left bank. failure contributing fines
762 4 redds observed near beginning of unit
2512 tributary entering right bank. at 85' temp 56
3864 tributary entering left bank. at 68'
4140 old road crossing
4594 right bank. failure contributing fines and gravel
6627 tributary enters right bank. at 15'
6706 left bank. failure 12'h x 30'l contributing fines
6951 tributary entering left bank. at 144'
6978 r. and l. bank failure 12' high contrib. fines.
8075 log across creek about 3' high creating plunge
9467 tributary enters left bank. at 92'. ocular survey for 1/8 mile no fish present and no suitable spawning habitat.
11390 END OF SURVEY. no suitable spawning habitat. no fish observed for last 500'. channel approaching A2. highly entrenched

D.I.H.

STREAM INVENTORY REPORT
MCGUIRE CREEK

WATERSHED OVERVIEW

McGuire Creek is a tributary to the Little North Fork Ten Mile River (LNFT). Elevations range from 280 feet at the mouth of the creek to 1,800 feet in the headwater areas. McGuire Creek's legal description at the confluence with the LNFT is T20N R17W Sec2. Its location is 39°37'9"N. latitude and 123°42'54"W. longitude according to the USGS Dutchmans Knoll 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of August 3, 1995 through August 8, 1995, was conducted by Diana Hines and David Lundby. The total length of stream surveyed was 9,870 feet (1.9 miles) including 19 feet of side channels (Table 1). Flow measured at the mouth of McGuire Creek on 8/4/95 was .66 cubic feet per second (cfs).

McGuire Creek is comprised of three reaches: reach one is a B3 channel type for the first 3,591 feet, reach two is a D4 channel type for the next 1,622 feet and reach three is a B4 channel type for the remaining 4,657 feet of creek.

Table 1 summarizes the Level II Riffle, Flatwater, and Pool Habitat Types. By percent occurrence, Riffles comprised 25%, Flatwater 30% and Pools 40%, of the habitat types in McGuire Creek (Graph 1). By percent total length, riffles comprised 15%, Flatwater 56%, and Pools 16% (Graph 2).

Twelve Level IV Habitat Types were identified in McGuire Creek. These data are summarized in Table 2. The most frequently occurring habitat types were Mid Channel Pools and Low Gradient Riffles both at 22%, as well as Step Runs at 19% (Graph 3). The most prevalent habitat types by percent total length were Step Runs at 50%, Dry units 13% and Low Gradient Riffles 12%.

Table 3 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Main pools were most often encountered at 56% occurrence and comprised 57% of the total length of pools.

Table 4 is a summary of maximum pool depths by pool habitat types. Pools with depths of two feet or greater are considered optimal for fish habitat. In McGuire Creek, 23 of the 101 pools (23%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 97 pool tail-outs measured, 0% had a value of 1, 0% had a value of 2, 15% had a value of 3 and 85% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Pool habitat types had the highest mean shelter rating at 42 (Table 1). Of the Level III Pool Types, Main Pools had the highest mean shelter rating at 49 (Table 3).

Of the 101 pools, 10% were formed by Large Woody Debris: 8% by logs and 2% by root wads (calculated from Table 4).

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles measured, 100% had gravel as the dominant substrate (Graph 6).

Mean percent closed canopy for McGuire Creek was 90%: 47% coniferous trees and 43% deciduous trees. Mean percent open was 10% (Graph 7).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. The mean percent right bank vegetated was 66% while the mean percent left bank vegetated was 59%. Coniferous trees were the dominant bank vegetation type observed in 44% of the units surveyed. Additionally, 19% of the units had deciduous trees as the dominant bank vegetation type. The dominant substrate composing the structure of the stream banks consisted of Sand/Silt/Clay, found in 94% of the units fully measured.

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

1309 bridge crossing
3184 tributary enters left bank at 19'
5141 tributary enters right bank at 175'
7272 two large log redwood jams over beginning of unit
7799 log jam over a pool 40’ L x 6'H x 12'W
8535 log jam consisting of conifers
9247 tributary enters right bank
9643 tributary enters left bank
9889 END OF ANADROMY; END OF SURVEY. cascade slope approx. 15% slope ending in a 15' drop; channel type approaching A3; no fish observed for last 1000'; no suitable spawning habitat observed; highly embedded with little canopy cover.

D.I.H.

STREAM INVENTORY REPORT

CAVANOUGH GULCH

WATERSHED OVERVIEW

Cavanough Gulch is a tributary to the North Fork Ten Mile River, located in Mendocino County, California. Elevations range from about 200 feet at the mouth of the Gulch to 1,800 feet in the headwater areas. Cavanough Gulch's legal description at the confluence with the North Fork Ten Mile River is T20N R16W Sec18. Its location is 39° 35' 52" N. latitude and 123° 40' 24" W. longitude according to the USGS Dutchmans Knoll 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of August 29 was conducted by Diana Hines and David Lundby. The total length of stream in Cavanough Gulch surveyed was 5,691 feet (1.1 miles) (Table 1). There were no side channels in this Gulch. Flow measured at the mouth of Cavanough Gulch on 9/13/95 was .127 cubic feet per second (cfs).

Cavanough Gulch is an B4 channel type for the entire stream surveyed.

Table 1 summarizes the Level II Riffle, Flatwater, and Pool Habitat Types. By percent occurrence, Riffles comprised 22%, Flatwater 29% and Pools 37% of the habitat types (Graph 1). By percent total length, Riffles comprised 12%, Flatwater 28% and Pools 7% (Graph 2).

Ten Level IV Habitat Types were identified in Cavanough Gulch. These data are summarized in Table 2. The most frequently occurring habitat types were Step Runs 24%, Low Gradient Riffles 22% and Mid Channel Pools 16% (Graph 3). The most prevalent habitat types by percent total length were Dry Units at 54%, followed by Step Runs at 26% and Low Gradient Riffles at 12%.

Table 3 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Scour Pools were the most often encountered at 48% occurrence and comprised 51% of the total length of pools.

Table 4 is a summary of maximum pool depths by pool habitat types. Pools with a depth of two feet or greater are considered optimal for fish habitat. In Cavanough Gulch, 7 of the 33 Pools (21%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 28 pool tail-outs measured, 4% had a value of 1; 4% had a value of 2; 54% had a value of 3 and 39% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Pool Habitat Types had the highest mean shelter rating at 65 (Table 1). Of the Level III Pool Types, Scour Pools had the highest mean shelter rating at 69 (Table 3).

Of the 33 Pools, 15% were formed by Large Woody Debris: 15% by logs and none by root wads (calculated from Table 4).

Table 6 summarizes the dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 75% had small cobble as the dominant substrate (Graph 6).

Mean percent closed canopy was 98%: 75% deciduous trees and 23% coniferous trees. Mean percent open was 2% (Graph 7).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. The mean percent right bank vegetated was 63% while the mean percent left bank vegetated was 67%. Coniferous trees were the dominant bank vegetation type observed in 53% of the units fully measured. Additionally, 38% of the units had deciduous trees as the dominant bank vegetation, including down trees, logs, and root wads. The dominant substrate comprising the structure of the stream banks consisted of Cobble/Gravel, found in 68% of the units fully measured (Table 7).

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

204	road crossing with culvert 8'x40'
540	tributary enters left bank.
572	5' plunge
4121	log jam 7'hx15'wx10'l. channel getting steeper and more entrenched
5154	tributary entering left bank. at 745. slope ~30%
5691	END OF SURVEY/END OF ANADROMY. Gulch splits equally into B4 channels which approach A4 within 50 feet. highly entrenched, slope of 12%, no fish observed since unit 60 or 61, habitat non-existent and worsening past the split.

D.I.H.

STREAM INVENTORY REPORT
O'CONNER GULCH

WATERSHED OVERVIEW

O'Conner Gulch is a tributary to the North Fork Ten Mile River. Elevations range from about 200 feet at the mouth of the creek to 1800 feet in the headwater areas. O'Conner Gulch's legal description at the confluence with the North Fork Ten Mile River is T20N R16W Sec8. Its location is 39° 36'13" N. latitude and 123°39'42" W. Longitude, according to the USGS Dutchmans Knoll 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of September 5, 1995 was conducted by Diana Hines and David Lundby. The total length of stream in O'Conner Gulch surveyed was 3,488 feet (.66 miles) (Table 1). There were no side channels in this creek. Flow measured at the mouth of O'Conner Gulch on 9/13/95 was .254 cubic feet per second (cfs).

O'Conner Gulch is a B4 channel type for the entire 3,488 feet of stream surveyed.

Table 1 summarizes the Level II Riffle, Flatwater, and Pool habitat types. By percent occurrence, Riffles comprised 33%, Flatwater 29% and Pools 35% of the habitat types in O'Conner Gulch (Graph 1). By percent total length, Riffles comprised 28%, Flatwater 59% and Pools 12% (Graph 2).

Seven Level IV Habitat Types were identified in O'Conner Gulch. The data are summarized in Table 2. The most frequently occurring habitat types were Low Gradient Riffles 28%, Step Runs 24% and Plunge Pools 20% (Graph 3). The most prevalent habitat types by percent total length were Step Runs at 56%, Low Gradient Riffles 25% and Plunge Pools 8% (Table 2).

Table 3 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Scour Pools were most often encountered at 55% occurrence and comprised 63% of the total length of pools in O'Conner Gulch.

Table 4 is a summary of maximum pool depths by pool habitat types. Pools with depths of two feet or greater are considered optimal for fish habitat. In O'Conner Gulch, 10 of the 29 pools (34%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 29 pool tail-outs measured, 0% had a value of 1, 10% had a value of 2, 17% had a value of 3 and 72% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Riffle habitat types had the highest mean shelter rating at 76 (Table 1). Of the Level III Pool Types, Scour Pools had the highest mean shelter rating at 94 (Table 3).

Of the 29 pools in O'Conner Gulch, none were formed by Large Woody Debris.

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles measured, 67% had gravel as the dominant substrate Graph 6).

Mean percent closed canopy was 99%: 23% coniferous trees and 76% deciduous trees. Mean percent open was 1% (Graph 7).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. The mean percent right bank vegetated in O'Conner Gulch was 43% while the mean percent left bank vegetated was 44%. Deciduous trees were the dominant bank vegetation type observed in 54% of the units fully measured. Additionally, coniferous trees were the dominant bank vegetation type in 39% of units fully measured. The dominant substrate composing the structure of the stream banks was Cobble/Gravel, found in 43% of the units fully measured.

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

299 culvert with plunge of 7' dropping into end of pool; fish barrier, however, culvert to be replaced with bridge in 1995
410 culvert has 6' circumference and is approximately 101' long
745 channel type done here
1955 tributary entering right bank at 6'
3015 bank failure on right bank (15'h x 40'l)
3169 slope is approximately 10%
3488 END OF SURVEY; channel splits into two even tributaries that are highly entrenched and lacking in suitable spawning habitat; slope approaching 10% or higher; channel type done here.

D.I.H.

STREAM INVENTORY REPORT
BALD HILL CREEK WATERSHED

WATERSHED OVERVIEW

Bald Hill Creek is a tributary to the North Fork Ten Mile River, located in Mendocino County, California. Bald Hill Creek has two surveyed tributaries: East Branch Bald Hill and North East Fork Bald Hill. Bald Hill Creek's legal description at the confluence with the North Fork Ten Mile River is T19N R16W Sec9. Its location is 39°36'12" N. latitude and 123°38'25" W. longitude according to the USGS Dutchmans Knoll 7.5 minute quadrangle. Elevations range from about 200 feet at the mouth of the creek to 2,000 feet in the headwater areas.

HABITAT INVENTORY RESULTS

The habitat inventory of August 17, through 24, 1995, was conducted by Diana Hines, David Lundby and Dave Wright. The results from Bald Hill Creek and its two tributaries are presented as the Bald Hill Creek watershed unless otherwise stated. The total length of stream in Bald Hill Creek surveyed was 14,211 feet with an additional 174 feet of side channels. The total length for East Branch Bald Hill was 5,454 feet and 3,173 feet for North East Fork Bald Hill. Neither of these tributaries had side channels. The total length of stream surveyed in the Bald Hill Creek watershed including side channels was 23,012 feet (4.4 miles) (Table 1).

Flow was measured in the Bald Hill Creek watershed on 8/18/95. Flow measured at the mouth of Bald Hill Creek was 1.61 cubic feet per second (cfs). Flow measured at East Branch Bald Hill was .619 cfs while North East Fork Bald Hill had a flow of .247 cfs.

Bald Hill Creek is comprised of three reaches. Reach one is a B3 channel type for the first 5,677 feet, reach two is a F2 channel type for the next 7,555 feet and reach three is a B2 channel type for the remaining 979 feet of creek. East Branch Bald Hill consists of one reach and is a B3 channel type for the entire 5,454 feet. North East Fork Bald Hill consists of three reaches. Reach one is a F2 channel type for the first 1,292 feet, reach two is a B3 channel type for the next 1,409 feet and reach three is a F3 channel type for the remaining 472 feet of creek.

Table 1 summarizes the Level II Riffle, Flatwater, and Pool Habitat Types. By percent occurrence, Riffles comprised 28%, Flatwater 28% and Pools 42% of the habitat types (Graph 1). Riffle habitat types made up 22% of the total survey length, Flatwater 47% and Pools 26% (Graph 2).

Seventeen Level IV Habitat Types were identified in the Bald Hill Creek watershed. These data are summarized in Table 2. The most frequently occurring habitat types were Low Gradient Riffles 22%, Mid Channel Pools 20% and Step Runs 18% (Graph 3). The most prevalent habitat types by percent total length were 39% Step Runs, 17% Low Gradient Riffles and 12% Mid Channel Pools.

Table 3 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Scour Pools were most often encountered at 51% occurrence and comprised 53% of the total length of pools.

Table 4 is a summary of maximum pool depths by Pool Habitat Types. Pools with a depth of two feet or greater are considered optimal for fish habitat. Of the 261 pools, 109 (42%) were two feet or more in depth (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 261 pool tail-outs measured, 12% had a value of 1, 35% had a value of 2, 34% had a value of 3 and 19% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Pools had the highest mean shelter rating at 68 (Table 1). Of the Level III Pool Types, Backwater Pools had the highest mean shelter rating at 77 (Table 3).

Of the 261 pools, 16% were formed by Large Woody Debris: 7% by logs and 10% by root wads (calculated from table 4).

Table 6 summarizes the dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles measured, 75% had gravel as the dominant substrate (Graph 6).

Mean percent closed canopy was 87%: 37% coniferous and 50% deciduous. Mean percent open was 13% (Graph 7).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. Mean percent right bank vegetated was 49% while the mean percent left bank vegetated was 50%. Deciduous trees were the dominant bank vegetation type observed in 44% of the units fully measured. Additionally, 39% of the units had coniferous trees as the dominant bank vegetation, including downed trees, logs, and root wads. The dominant substrate composing the structure of the stream banks was Sand/Silt/Clay, found in 45% of the units fully measured.

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

Mainstem Bald Hill Creek:

754 channel type here
1,871 bridge crossing
1,871 bridge crossing
1,907 bridge crossing - artificial boulders, bridge is providing canopy
2,179 RBA site BH #1
2,233 hobo temp site in Pools
2,375 Riffle hobo temp site

3,119 tan oak bank failure on left bank contributing fines, tree 2' above creek - transverse
3,207 tan oak bank failure
4,185 bank failure left bank 60l x 40h contributing fines
4,303 right bank failure contributing fines
4,338 right bank failure confined. 8 small tan oaks, four - 14' Douglas firs across creek - root wads creating scour, total 80l x 30h of failure
5,256 right bank failure contributing fines, one massive tan oak in creek
5,412 left bank failure contributing fines 50 x 50, Douglas fir in creek - 6' above
5,558 confluence with E. Branch Bald Hill
5,827 left bank failure (70 x 30) contributing fines, Douglas fir/tan oak in creek 2' high
5,899 channel type
6,181 log jam here LWD (15'l x 40'w x 6'h)
6,238 probably a plunge in high flow
6,311 LWD jam over creek, sub surface flow here and there
6,464 dry trib entering right bank at 54'
8,668 trib entering right bank at 11'
10,051 confluence with major trib, N.E. Fork Bald Hill
10,365 39’l x 40’w x 7’h of log jam
10,492 8’ plunge
11,447 trib entering right bank at 11'
11,671 massive right bank failure contributing fines, 150’l x 80’h - LWD in creek
12,368 6' plunge
12,486 left bank failure contributing fines 40’l x 50’h
13,297 channel type here, lots of fish
13,546 possible fish barrier - 9' high drop from a dry unit
13,732 no fish observed
13,800 no fish observed
13,923 no fish observed
13,972 unit ends in a 5' vertical step to a bedrock Pools then a 7' step, very unlikely fish can make this
14,211 END OF ANADROMY - 65' vertical bedrock waterfall

East Branch Bald Hill:

300 log jam across end of pools (6'h x 20'w x 10'l) mostly LWD
636 bank failure on right bank (30'l x 12'h) contributing sand and gravel
1100 channel type done here
1889 log providing 3' of cover
2200 cascade has approximately 70% slope

2270 11% slope in approximately 70' distance
2288 bank failure on right bank (60'l x 40'h) contributing sand and cobble
2419 still observing fish
3244 road crossing
3671 log jam over end of pools (12'w x 8'h x 6'l) mainly LWD
3929 bank failure on left bank (14'h x 30'l)
4006 7' steelhead in pools
5162 bank failure on right bank (25'h x 40'l) contributing sand and gravel
5277 log jam over pools (10'h x 30'w x 16'l)
5370 bank failure on right bank contributing sand and cobble (10'h x 35'l)
5454 END OF SURVEY. END OF ANADROMY. 18' waterfall, ocular survey of fish for approximately 300’ above waterfall, none observed.

Northeast Fork Baldhill

611 log jam (30'w x 12'h x 30'l) consists of LWD
801 log jam (25'w x 16'h x 20'l) possible fish barrier. this log jam approximately 700' up from confluence with Bald Hill Creek
1140 fish have not been seen since unit # 26
1231 channel type done here
1246 approximately 6' plunge
1476 8' plunge
1564 log jam at end of Pools with LWD (7'h x 15'w x 12'l)
1784 log jam over middle of unit (17'h x 30'w x 25'l) culvert running along unit with 2' circumference, 40’ long
2005 log jam at beginning of unit (12'h x 25'w x 12'l) consists of LWD
2796 this dry run has slope of approximately 20 degrees
2852 major tributary on right bank, dry, has slope of about 30%
3173 END OF ANADROMY, END OF SURVEY; channel type done here, F3 channel type. lack of suitable spawning habitat, high embeddedness, highly entrenched channel, slope is 12.8%. no fish observed since unit # 26 or approximately 1,800'.

D.I.H.

STREAM INVENTORY REPORT
GULCH 8

WATERSHED OVERVIEW

Gulch 8 is a tributary to the North Fork Ten Mile. Elevations range from about 360 feet at the mouth of the creek to 2,200 feet in the headwater areas. Gulch 8's legal description at the confluence with the North Fork Ten Mile River is T20N R16W Sec15. Its location is 39° 35'40" N. latitude and 123°36'38" W. longitude according to the USGS Dutchmans Knoll 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of September 6, through September 7, 1995, was conducted by Diana Hines and David Lundby. The total length of stream in Gulch 8 surveyed was 5,455 feet (1.0 miles). There were no side channels in this Gulch (Table 1). Flow measured at the mouth of Gulch 8 on 9/13/95 was .955 cubic feet per second (cfs).

Gulch 8 is a B3 channel type for the entire stream surveyed.

Table 1 summarizes the Level II Riffle, Flatwater, and Pool Habitat Types. By percent occurrence, Riffles comprised 33%, Flatwater 25% and Pools 41% of the habitat types (Graph 1). Of the total survey length, Riffles comprised 27%, Flatwater 48% and Pools 23% (Graph 2).

Fourteen Level IV Habitat Types were identified in Gulch 8. The data are summarized in Table 2. The most frequently occurring habitat types were Mid Channel Pools 27%, Low Gradient Riffles 25% and Step Runs 18% (Graph 3). The most prevalent habitat types by percent total length were Step Runs 44%, Low Gradient Riffles 22% and Mid Channel Pools 16% (Table 2).

Table 3 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Main pools were most often encountered at 69% occurrence and comprised 76% of the total length of pools in Gulch 8.

Table 4 is a summary of maximum pool depths by Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In Gulch 8, 24 of the 61 pools (39%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 58 pool tail-outs measured in Gulch 8, 3% had a value of 1, 31% had a value of 2, 29% had a value of 3 and 36% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Pool habitat types had the highest mean shelter rating in Gulch 8 at 63 (Table 1). Of the Level III Pool Types in Gulch 8, Scour Pools had the highest mean shelter rating at 98 (Table 3).

Of the 61 pools in Gulch 8, 3% were formed by Large Woody Debris: 2% by logs and 2% by root wads (calculated from Table 4).

Table 6 summarizes dominant substrate for Level IV Habitat Types. Gravel, small cobble and boulders all occurred equally as the dominant substrate in the Low Gradient Riffles measured at 33% each (Graph 6).

Mean percent closed canopy for Gulch 8 was 86%: 35% coniferous trees and 51% deciduous trees. Mean percent open was 14% (Graph 7).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. The mean percent right bank vegetated was 50% while the mean percent left bank vegetated was 49%. Deciduous trees were the dominant bank vegetation type observed in 43% of the fully measured. Additionally, 26% of the units had coniferous trees as the dominant bank vegetation type. The dominant substrate composing the structure of the stream banks was Cobble/Gravel, found in 35% of the units fully measured.

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

813 channel type done here

3436 creek splits here - 1/4 and 3/4. the small one is highly entrenched, with 3 possible fish barriers in about 500', no fish observed in 1000', slope generally 6%, 10-12% in places- no spawning habitat

4629 bank failure on left bank (35'l x 40'h) contributing fines

5214 culvert with 8' circumference under road crossing, 40'l

5356 possible fish barrier

5370 approximately 7' plunge at end of pool with nothing for fish to jump into on top, possible fish barrier

5455 END OF SURVEY, END OF ANADROMY. channel splits at end of cascade into two tribs. cascade continues further on east trib with slope of approximately 12% or higher with a 12' waterfall in portion of cascade. ocular survey for fish, none were observed. channel approaching A2 channel type. west trib also has cascade with slope of 15%, also approaching A2 channel type

D.I.H.

STREAM INVENTORY REPORT
GULCH 11

WATERSHED OVERVIEW

Gulch 11 is a tributary to the North Fork Ten Mile River. Elevations range from about 400 feet at the mouth of the creek to 2,600 feet in the headwater areas. Gulch 11's legal description at the confluence with the North Fork Ten Mile River is T20N R16W Sec14. Its location is 39° 35'15" N. latitude and 123°36'18" W. longitude according to the USGS Sherwood Peak 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of September 7, 1995, was conducted by Diana Hines and David Lundby. The total length of stream in Gulch 11 surveyed was 5,021 feet (.95 miles). There were no side channels in this creek (Table 1). Flow measured at the mouth of Gulch 11 on 9/13/95 was .297 cubic feet per second (cfs).

Gulch 11 is comprised of one reach for the entire 5,021 feet of creek and is a B2 channel type.

Table 1 summarizes Level II Riffle, Flatwater, and Pool Habitat Types. By percent occurrence, Riffles comprised 43%, Flatwater 31% and Pools 26% of the habitat types (Graph 1). By percent total length, Riffles comprised 36%, Flatwater 56% and Pools 8% (Graph 2).

Eight Level IV Habitat Types were identified in Gulch 11. These data are summarized in Table 2. The most frequently occurring habitat types were Low Gradient Riffles 31%, Step Runs 20% and Plunge Pools 17% (Graph 3). The most prevalent habitat types by percent total length were Step Runs at 50%, Low Gradient Riffles 29% and both Runs and Plunge Pools at 6% (Table 2).

Table 3 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Scour pools were most often encountered at 67% occurrence and comprised 70% of the total length of pools.

Table 4 is a summary of maximum pool depths by pool habitat types. Pools with depths of two feet or greater are considered optimal for fish habitat. In Gulch 11, 10 of the 33 pools (30%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 33 pool tail-outs measured in Gulch 11, 0% had a value of 1, 24% had a value of 2, 45% had a value of 3 and 30% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Riffles had the highest mean shelter rating at 43 (Table 1). Of the Level III Pool Types, Scour pools had the highest mean shelter rating at 46 (Table 3).

Of the 33 pools in Gulch 11, none were formed by Large Woody Debris.

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles measured, 75% had boulders as the dominant substrate (Graph 6).

Mean percent closed canopy was 81%: 51% coniferous trees and 30% deciduous trees. Mean percent open was 19% (Graph 7).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. The mean percent right bank vegetated in was 59% while the mean percent left bank vegetated was 69%. Deciduous trees were the dominant bank vegetation type observed in 48% of the units fully measured. Additionally, coniferous trees were the dominant bank vegetation type in 38% of the units fully measured The dominant substrate composing the structure of the stream banks was Boulder, found in 38% of the units fully measured.

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

895	channel type done here
2647	bank failure on right bank (20'l x 9'h)
2673	possible fish barrier, slope of approximately 15%
2855	bank failure on left bank 40'h x 50'l
2963	bank failure on left bank approximately (50'l x 40'h)
3537	old road crossing
3796	plunge of 7'
4398	possible fish barrier, slope of approximately 20%
4708	bank failure on left bank (50'h x 80'l) contributing gravel and sand
5021	END OF SURVEY, END OF ANADROMY; 15' vertical drop at end of pool, approximately 70% slope, cascade consists of bedrock and is lacking in any pools. fish not observed since unit #54

D.I.H.

STREAM INVENTORY REPORT
GULCH 19

WATERSHED OVERVIEW

Gulch 19 is a tributary to the North Fork Ten Mile. Elevations range from about 480 feet at the mouth of the creek to 2,600 feet in the headwater areas. Gulch 19's legal description at the confluence with the Little North Fork Ten Mile River is T20N R16W Sec24. Its location is 39° 34'37" N. latitude and 123°34'58" W. longitude according the USGS Sherwood Peak 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of September 7, through September 8, 1995, was conducted by Diana Hines and David Lundby. The total length of stream in Gulch 19 surveyed was 5,455 feet (1.0 miles). There were no side channels in this creek (Table 1). Flow measured at the mouth of Gulch 19 on 9/13/95 was .155 cubic feet per second (cfs).

Gulch 19 is comprised of one reach for the entire 5,455 feet of creek and is an F3 channel type.

Table 1 summarizes the Level II Riffle, Flatwater, and Pool Habitat Types. By percent occurrence, Riffles comprised 38%, Flatwater 30% and Pools 32% of the habitat types (Graph 1). By percent total length, Riffle habitat types comprised 42%, Flatwater 39% and Pools 18% (Graph 2).

Eleven Level IV Habitat Types were identified in Gulch 19. The data are summarized in Table 2. The most frequently occurring habitat types were Low Gradient Riffles 24%, Plunge Pools 17% and Runs 16% (Graph 3). The most prevalent Habitat Types by percent total length were Runs at 27%, Low Gradient Riffles 23% and High Gradient Riffles 13% (Table 2).

Table 3 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Scour pools were most often encountered at 53% occurrence and comprised 51% of the total length of pools in Gulch 19.

Table 4 is a summary of maximum pool depths by pool habitat types. Pools with depths of two feet or greater are considered optimal for fish habitat. In Gulch 19, 19 of the 64 pools (30%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 61 pool tail-outs measured in Gulch 19, 5% had a value of 1, 8% had a value of 2, 23% had a value of 3 and 64% had a value of 4 (Graph 5).

Of the Level II Habitat Types, pool habitat types had the highest mean shelter rating at 58 (Table 1). Of the Level III Pool Types, Backwater Pools had the highest mean shelter rating at 95 (Table 3).

Of the 64 pools in Gulch 19, there were none formed by Large Woody Debris.

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles measured, 50% had gravel as the dominant substrate (Graph 6).

Mean percent closed canopy was 87%: 49% coniferous trees and 38% deciduous trees. Mean percent open was 13% (Graph 7).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. The mean percent right bank vegetated in Gulch 19 was 57% while the mean percent left bank vegetated was 59%. Coniferous trees were the dominant bank vegetation type observed in 50% of the units fully measured. Additionally, 21% of the units had deciduous trees as the dominant vegetation type. The dominant substrate composing the structure of the stream banks was Sand/Silt/Clay, found in 38% of the units fully measured.

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

498	culvert at end of pool creating approximately 4' plunge
579	6' circumference culvert 62’ long
887	channel type done here
1537	bank failure on left bank (30'h x 40'l)
2374	trib entering right bank at beginning of this unit
2473	old road crossing
3762	channel type done here
4032	log jam over middle of step run 10'h x 12'w x 25'l, mainly LWD
5455	END OF SURVEY. channel splits into two tributaries which are dry and have steep gradients. highly entrenched channels. fish have not been observed for last 600’ approximately

D.I.H.

STREAM INVENTORY REPORT
PATSY CREEK

WATERSHED OVERVIEW

Patsy Creek is a tributary to the North Fork Ten Mile River, located in Mendocino County, California. Elevations range from approximately 500 feet at the mouth of the creek to 1,600 feet in the headwater areas. Patsy Creek's legal description at the confluence with the North Fork Ten Mile River is T20N R15W Sec18. Its location is 39°34'50" N. latitude and 123°34'20" W. longitude, according to the USGS Sherwood Peak 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of September 11 through September 13 1995, was conducted by Diana Hines, David Lundby and Dave Wright. The total length of stream in Patsy Creek surveyed was 8,009 feet (1.5 miles) (Table 1). There were no side channels in this creek. Flow measured at the mouth of Patsy Creek on 9/13/95 was .218 cubic feet per second (cfs).

Patsy Creek is an F3 channel type for the entire stream surveyed.

Table 1 summarizes the Level II Riffle, Flatwater, and Pool Habitat Types. By percent occurrence, Riffles comprised 35%, Flatwater 34% and Pools 30% of the habitat types (Graph 1). By percent total length, Riffles comprised 33%, Flatwater 45 % and Pools 19% (Graph 2).

Twelve Level IV Habitat Types were identified in Patsy Creek. The data are summarized in Table 2. The most frequently occurring habitat types were Low Gradient Riffles 30%, Mid Channel Pools 20% and Runs 19% (Graph 3). The most prevalent habitat types by percent total length were Step Runs at 30%, followed by Low Gradient Riffles at 28% and Runs at 15%.

Table 3 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Main pools were most often encountered at 67% and comprised 66% of the total length of pools.

Table 4 is a summary of maximum pool depths by pool habitat types. Pools with depths of two feet or greater are considered optimal for this habitat. In Patsy Creek, 22 of the 70 pools (31%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 71 pool tail-outs measured, 11% had a value of 1, 24% had a value of 2, 11% had a value of 3 and 54% had a value of 4 (Graph 5).

Of the Level II Pool Habitat Types, Pools had the highest mean shelter rating in Patsy Creek at 73 (Table 1). Of the Level III Pool Types, Main Pools had the highest mean shelter rating at 78 (Table 3).

Of the 70 pools, 7% were formed by Large Woody Debris: 3% by logs and 4% by root wads (calculated from Table 4).

Table 6 summarizes the dominant substrate by Level IV Habitat Types. Both gravel and boulders occurred 33% each as the dominant substrate types in the Low Gradient Riffles fully measured (Graph 6).

Mean percent closed canopy was 91%: 38% coniferous trees and 53% deciduous trees. Mean percent open was 9% (Graph 7).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. The mean percent right bank vegetated was 75% while the mean percent left bank vegetated was 81%. Deciduous trees were the dominant bank vegetation type observed in 53% of the units fully measured. Additionally, 36% of the units had coniferous trees as the dominant bank vegetation, including downed trees, logs, and root wads. The dominant substrate comprising the structure of the stream banks consisted of Cobble/Gravel, found in 47% of the units fully measured.

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

305 road over this unit with wooden bridge
1422 channel type done here
3916 tributary entering right bank at end of unit
4932 tributary entering left bank
5561 log jam (10'h x 8'w x 15'l)
5683 log jam (12'h x 30'w x 40'l), mainly LWD
6044 fish not observed since unit 150
6105 bank failure on left bank (25'h x 30'l)
6435 fish observed again
6704 log jam over creek (14'h x 25'w x 12'l) both LWD and SWD
7344 log jam
7715 tributary entering left bank at 20'
7996 cascade has slope of approximately 23%
8009 END OF ANADROMY, END OF SURVEY; pool ends in a boulder-bedrock cascade with a slope of 30%. cascade continues for approximately 280'. fish have not been observed for last 800'.

D.I.H

STREAM INVENTORY REPORT
GULCH 23

WATERSHED OVERVIEW

Gulch 23 is a tributary to the North Fork Ten Mile. Elevations range from about 620 feet at the mouth of the creek to 2,600 feet in the headwater areas. Gulch 23's legal description at the confluence with the North Fork Ten Mile River is T20N R15W Sec17. Its location is 39°35'5" N. latitude and 123°32'45" W. longitude according to the USGS Sherwood Peak 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of November 2, 1995, was conducted by Diana Hines and David Lundby. The total length of stream in Gulch 23 surveyed was 2,454 feet (.46 miles). There were no side channels in this creek (Table 1).

Gulch 23 is comprised of one reach for the entire 2,454 feet of creek and is a B3 channel type.

Table 1 summarizes the Level II Riffle, Flatwater, and Pool habitat types. By percent occurrence, Riffles comprised 49%, Flatwater 20% and Pools 25% of the habitat types in Gulch 23 (Graph 1). By percent total length, Riffle Habitat Types comprised 38% of the total survey length, Flatwater 23% and Pools 9% (Graph 2).

Nine Level IV Habitat Types were identified in Gulch 23. The data are summarized in Table 2. The most frequently occurring habitat types were Cascades 20%, Step Runs 19% and Low Gradient Riffles 17% (Graph 3). The most prevalent habitat types by percent total length were Dry units 30%, Step Runs 23% and High Gradient Riffles 15% (Table 2).

Table 3 summarizes Main, Scour and Backwater Pools which are Level III Pool Types. Main Pools were most often encountered at 67% occurrence and comprised 70% of the total length of pools in Gulch 23.

Table 4 is a summary of maximum pool depths by pool habitat types. Pools with depths of two feet or greater are considered optimal for fish habitat. In Gulch 23, 2 of the 15 pools (13%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 15 pool tail-outs measured in Gulch 23, 0% had a value of 1, 7% had a value of 2, 20% had a value of 3 and 73% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Riffle habitat types had the highest mean shelter rating in Gulch 23 at 113 (Table 1). Of the Level III Pool Types in Gulch 23, Main pools had the highest mean shelter rating at 41 (Table 3).

Of the 15 pools in Gulch 23, none were formed by Large Woody Debris.

Table 6 summarizes the dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles measured, 100% had boulders as the dominant substrate (Graph 6).

Mean percent closed canopy for Gulch 23 was 90%: 35% coniferous trees and 55% deciduous trees. Mean percent open was 10% (Graph 7).

Table 7 summarizes the mean percent substrate/vegetation types found along the banks of the stream. The mean percent right bank vegetated was 59% while the mean percent left bank vegetated was 48%. Coniferous trees were the dominant bank vegetation type observed in 67% of the units fully measured. Additionally, deciduous trees were the dominant bank vegetation type in 21% of the units fully measured The dominant substrate composing the structure of the stream banks was Cobble/Gravel, found in 46% of the units fully measured

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

1011 cow patties in and along creek, cattle trail crosses creek and runs along creek in this unit and the previous 4 or 5 units
1114 cattle trail crosses creek here
1517 channel type done here
1643 bank failure on right bank contributing sand and LWD (12'h x 25'l)
2331 bank failure on left bank (15'h x 30'l) contributing fines
2454 END OF ANADROMY, END OF SURVEY. channel has become a B2 with gradient of over 12%. no fish have been observed entire survey. very little spawning habitat observed. signs of heavy cattle use throughout creek.

D.I.H.

STREAM INVENTORY REPORT
CLARK FORK TEN MILE RIVER

WATERSHED OVERVIEW

The Clark Fork Ten Mile River is a tributary to the Ten Mile River. Elevations range from 140 feet at the mouth to 3,000 feet in the headwater areas. Clark Fork Ten Mile River confluence location is T20N R17W Sec25, 39° 33'53" N. latitude, 123°42'30" W. longitude on the USGS Dutchmans Knoll 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of October 5, 1994 through July 7, 1995, was conducted by Diana Hines, David Lundby and Warren Mitchell. The total length of stream surveyed was 90,413 feet (17.1 miles) (Table 1). Side channels comprised 1,131 feet of this total. A 30 foot waterfall in upper Clark Fork Ten Mile is a barrier to anadromous fish migration resulting in 77,247 feet (14.6 miles) of anadromous fish habitat. The remaining 13,166 feet (2.5 miles) were surveyed as fish bearing habitat due to fish stocking upstream of this waterfall.

Clark Fork Ten Mile River is comprised of five reaches: B4 for 64,177 feet, B2 for 9,116 feet, F2 for 3,305 feet, B2 for 8,032 feet and F2 for 4,652 feet.

Table 1 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 26%, Flatwater 30% and Pools 44% (Graph 1). Of the total survey length, Riffles comprised 16%, Flatwater 40% and Pools 44% (Graph 2).

Twenty-two Level IV Habitat Types were identified (Table 2). Of the Level IV Habitat Types, the most frequently occurring were Low Gradient Riffles 19%, Mid Channel Pools 17% and Step Runs 16% (Graph 3). Of the total survey length, Step Runs comprised 29%, Mid Channel Pools 17% and Lateral Scour Bedrock Pools 13% (Table 2).

Table 3 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Scour pools were most often encountered at 58% occurrence and comprised 58% of the total length of pools.

Table 4 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In CFT, 424 of the 472 pools (90%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 472 pool tail-outs measured in CFT, 2% had a value of 1, 12% had a value of 2, 31% had a value of 3 and 55% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Riffles had the highest mean shelter rating at 47 (Table 1). Of the Level III Pool Habitat Types, Scour pools had the highest mean shelter rating at 50 (Table 3).

Of the 472 pools, 15% were formed by Large Woody Debris: 8% by logs and 7% by root wads (calculated from Table 5).

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 38% had gravel as the dominant substrate type (Graph 6).

Mean percent closed canopy was 76%: 25% coniferous trees, 51% deciduous trees. Mean percent open canopy was 24% (Graph 7, calculated from Table 7).

Mean percent right bank vegetated was 51% while mean percent left bank vegetated was 56%. Deciduous trees occurred most often as bank vegetation at a mean percent of 62 (of units fully measured). Sand/Silt/Clay occurred most often as bank substrate with a mean percent of 51 (of units fully measured) (Table 7).

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

1589	RBA site
1669	HOBO TEMP site
10006	SWDA
10306	SWDA retaining gravel
10559	SWDA
16972	LWDA 28'WX3'H retaining SWD
18072	confl. with Bear Haven Creek
37303	RBA site
37841	confl. with Little Bear Haven Creek
43932	log jam pool -- LWDA 30'WX8'LX8'H
54505	confl. with Booth Gulch
62853	confl. with Fox Gulch
64556	end of survey season 1994
67444	RBA site
67481	HOBO TEMP pool
67899	RB failure 20'HX20'W contrib. fines
68065	3 redds obs.
68559	4 redds obs.
68890	2 redds obs.
69044	1 redd obs.
70424	8 redds obs.
70475	8' of undercut root wad
70515	6' of undercut root wad
71529	wet crossing
72165	2 redds obs.

72419	2 redds obs.
76116	falls of CFTM..steep 10' cascade then a 20' freefall- 30' total-- end of the line for anadromous fishes but survey continues due to upstream fish stocking.
76598	gulch 27 enters RB
77416	LB failure 60'LX40'H
78010	LWDA 80'LX20'HX45'W
80480	LWDA 20'LX50'WX6'H
80587	LB FAILURE 50'WX15'H
81219	HOBO TEMP site
81377	RBA site
81926	LWDA 10'LX15'WX5'H
82011	RB failure 75'LX30'H contrib. fines
82535	LWDA
82643	LB failure 75'LX25'H
83198	LB failure 50'LX40'H contrib. fines and LWD
84211	RB failure 50'LX80'H
89282	END OF ANADROMY-- next unit is a 140' cascade slope approx. 40% with no suitable jump or landing pools.. substrate bedrock angular boulders and cobble.

D.L.

STREAM INVENTORY REPORT
BEAR HAVEN CREEK WATERSHED

WATERSHED OVERVIEW

Bear Haven Creek is a tributary to the Clark Fork Ten Mile River. Elevations range from about 80 feet at the mouth of the creek to 1,600 feet in the headwater areas. Bear Haven Creek confluence location is T20N R16W Sec31, 39°33'12" N. latitude, 123°40'47" W. longitude on the USGS Dutchmans Knoll 7.5 minute quadrangle. The results from Bear Haven Creek and its surveyed tributary, South Fork Bear Haven Creek, are presented as the Bear Haven Creek Watershed unless otherwise stated

HABITAT INVENTORY RESULTS

The habitat inventory of August 23 through August 26, 1994 was conducted by Warren Mitchell and David Lundby.. The total length of surveyed stream in Bear Haven Creek was 29,942 feet (5.7 miles). Side channels comprised 409 feet of this total. The total length for South Fork Bear Haven Creek was 5,847 feet (1.1 miles). The total length of stream surveyed in the Bear Haven Creek Watershed including side channels was 35,789 feet (6.8 miles) (Table 1).

Bear Haven Creek is comprised of one reach for the entire 29,533 feet of creek and is a C4 channel type. South Fork Bear Haven Creek is a B4 for 5847 feet.

Table 1 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 22%, Flatwater 30% and Pools 45% (Graph 1). Of the total survey length**,** Riffles comprised 16%, Flatwater 45% and Pools 33% (Graph 2).

Eighteen Level IV Habitat Types were identified (Table 2). Of the Level IV Habitat Types, the most frequently occurring were Low Gradient Riffles 21%, Step Runs 16% and Mid Channel Pools 15%(Graph 3). Of the total survey length, Step Runs comprised 33%, and Low Gradient Riffles 15% (Table 2).

Table 3 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Scour pools were most often encountered at 64% occurrence and comprised 63% of the total length of pools.

Table 4 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In the Bear Haven Creek Watershed, 134 of the 332 pools (40%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 332 pool tail-outs measured in Bear Haven Creek Watershed, 0% had a value of 1, 1% had a value of 2, 17% had a value of 3 and 82% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Pools had the highest mean shelter rating at 31 (Table 1). Of the Level III Pool Habitat Types, Backwater pools had the highest mean shelter rating at 40 (Table 3).

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 86% had gravel as the dominant substrate type (Graph 6).

Of the 332 pools, 37% were formed by Large Woody Debris: 32% by logs and 5% by root wads (calculated from Table 5).

Mean percent closed canopy was 91%: 57% coniferous trees and 34% deciduous trees. Mean percent open canopy was 9% (Graph 7, calculated from Table 7).

Mean percent right bank vegetated was 60% while mean percent left bank vegetated was 63%. Coniferous trees occurred most often as bank vegetation at a mean percent of 48 (of units fully measured). Sand/Silt/Clay occurred most often as bank substrate with a mean percent of 91 (of units fully measured) (Table 7).

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

Bear Haven Creek Mainstem

90	LWDA 31'LX25'WX2'H under bridge
727	HOBO TEMP site
1233	LWDA 20'WX17'LX4'H
1363	dry trib enters L.B.
2860	dry trib enters R.B.
2902	dry trib enters L.B.
2949	dry trib enters RB causing bank failure 30'LX15'H
3564	dry trib enters L.B.
3884	logs at top of unit retaining gravel and fines
6982	LWDA 17'WX32'LX4'H forming pool
8034	R.B. failure 70'LX8'H contributing fines
8055	LWDA 34'LX36'WX8'H forming pool and retaining gravel and cobble, goes dry in retention area and then a pool is retained.
	remove LWDA
8224	L.B.failure 50'LX8'H
10996	SWDA 20'WX14'LX4'H LOG perpendicular to creek causing jam
11139	seep enters R.B. temp 53
11322	road crosses creek
11679	pipe enters R.B. with flowing water temp 56
11826	root wad collapsed in creek contributing fines
12219	LDA 15'WX25'LX3'H pool

13792	two 5' diameter logs fallen across creek retaining SWD and gravel
14207	7' diameter collapsed bole with root wad over creek retaining sand, gravel and LWD 25'WX17'LX3'H
15059	dry trib enters R.B.
15425	trib enters L.B. temp 53
16399	large log at top of unit retaining sand and gravel/cobble
16414	3' plunge
18161	no spawning grounds
19568	franciscan melange tail crest 1.5' plunge
20149	trib enters R.B. temp 53
20286	LWDA 30'WX40'LX5'H retaining fines and gravel
22261	trib enters L.B. at 37' temp 54
22617	LWDA 10'WX18'LX3'H
23652	R.B. is comprised of franciscan melange for about 30'
24143	LB temp 53
26021	1' plunge
26095	1.5' plunge
26242	1' plunge
26288	LB exposed soil 50' contributing fines and gravel
26468	LWDA 40'LX18'WX5'H
26769	4' PLUNGE
27118	LWDA 14'WX8'H jammed against 2 root wads on either side of creek retaining gravel and cobble root wads etc. for hundreds of feet
27340	YOY obs. dry trib entering RB
27524	6' root wad in creek forms 4' step retaining gravel
27543	2' plunge trib enters L.B.temp 54
28218	4' plunge at 90' but not forming pool very flat little valley. water filled with orange bacteria... this area is not really suitable for fish rearing water temp 58
29338	gradient starting to increase, channel width decreasing
29519	several large logs (2'-4' diam.) lying in creek, scattered throughout unit
29653	dry tribs enter L and R.B.
29723	END OF SURVEY...2.5' step at beginning of unit. stream dries up

South Fork Bear Haven Creek

26	road crosses creek no bridge.
674	trib enters LB temp 53
691	8' plunge
1159	3' plunge
2396	first bridge crossing at 256'
3639	4' step at 67'
3828	dry trib enters RB
4673	6'' plunge
4819	small LDA 10X8X4 retaining gravel and small cobble
5087	LDA 14X5X5 retaining gravel and cobble forming a dry unit behind
5354	dry trib enters L.B.
5791	dry trib enters L.B.
5847	END OF ANADROMY... 8.5' plunge. no launch pool below and no landing pool above.

D.L.

STREAM INVENTORY REPORT
LITTLE BEAR HAVEN CREEK

WATERSHED OVERVIEW

Little Bear Haven Creek is a tributary to the Clark Fork Ten Mile River. Elevations range from 200 feet at the mouth of the creek to 1,400 feet in the headwater areas. Little Bear Haven Creek confluence location is T20N R16W Sec33, 39° 33'07" N. latitude, 123°37'46" W. longitude on the USGS Dutchmans Knoll 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of September 11 through September 13, 1995, was conducted by Diana Hines and David Lundby. The total length of surveyed stream in Little Bear Haven Creek was 12,286 feet (Table 1). There were no side channels in this creek. Flow measured at the mouth of Little Bear Haven Creek on September 13, 1995 was .218 cubic feet per second (cfs).

Little Bear Haven Creek is comprised of three reaches; B3 for 5,879 feet, C4 for 6,286 feet and A4 for 121 feet.

Table 1 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 23%, Flatwater 30% and Pools 48% (Graph 1). Of the total survey length, Riffles comprised 13%, Flatwater 55% and Pools 33% (Graph 2).

Thirteen Level IV Habitat Types were identified (Table 2). Of the Level IV Habitat Types, the most frequently occurring were Mid Channel Pools 28%, Low Gradient Riffles 22%, and Step Runs and Runs 15% each (Graph 3). Of the total survey length, Step Runs comprised 41%, Mid Channel Pools 17 % and Runs 13% (Table 2).

Table 3 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Main pools were most often encountered at 59% occurrence and comprised 53% of the total length of pools.

Table 4 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In Little Bear Haven Creek, 62 of the 153 pools (41%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 153 pool tail-outs measured, 0% had a value of 1, 0% had a value of 2, 5% had a value of 3 and 95% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Pools had the highest mean shelter rating at 42 (Table 1). Of the Level III Pool Habitat Types, Scour pools had the highest mean shelter rating at 62 (Table 3).

Of the 153 pools, 6% were formed by Large Woody Debris: 5% by logs and 1% by root wads (calculated from Table 4).

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 75% had gravel as the dominant substrate (Graph 6).

Mean percent closed canopy was 91%: 45% coniferous trees and 46% deciduous trees. Mean percent closed canopy was 9% (Graph 7, calculated from Table 7).

Mean percent right bank vegetated was 61% while mean percent left bank vegetated was 59%. Grass occurred most often as bank vegetation at a mean percent of 47 (of units fully measured). Sand/Silt/Clay occurred most often as bank substrate with a mean percent of 53 (of units fully measured) (Table 7).

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

198	channel type done here
878	hobo temp site
930	seep entering right bank, RBA site
1034	large root wad in pool, small log jam along right bank
1648	this pool contains numerous LWD and a large root wad in the center providing good cover for fish
2143	dry trib entering left bank at 9'
2524	less bedrock along channel
3211	undercut bank of 4'
3242	trib entering left bank at 18'
4759	culvert entering right bank at 17'
5372	small log jam over stream (3'H X 15'W X 4'L)
5378	3' culvert entering pool on right bank
5598	bank failure along left bank contributing LWD, sand and gravel
5641	log jam over stream (5'h x 10'w x 30'l) possibly caused by bank failure along right bank
5722	bank failure on left bank contributing sand and gravel
5902	channel type completed here
6168	small log jam including three fallen redwood trees. bank failure on right bank contributing sand and gravel
6227	major log jam over stream (8'h x 18'w x 25'l)
6302	log jam over stream (4'h x 10'w x 12'l)
6684	extensive log jam over this unit and next approx (15'h x 20'w x 40'l)
6898	fallen logs over most of this unit

7775	small log jam over stream
7866	tributary entering right bank at end of this unit
8084	a foul smelling orange algae or bacteria is predominant through out this unit
8934	trib entering right bank at 23'. extensive amount of willows growing low over stream
10400	bank failure along left bank of stream contributing sand and gravel
10562	bank failure along left bank
11420	water clears up in middle of this unit
12165	dry small trib enters right bank at 30'
12286	END OF SURVEY: lack of suitable habitat for spawning. A-4 channel type, high embeddedness, no fish observed for last 600'. ocular survey for approx 100' from this unit - channel type remaining constant however substrate gradually changing from sand/gravel to cobble/boulder. alternating dry units and no fish observed. stream reduced to a trickle at most 2' wide. slope remaining constant at approx 8%

D.L.

STREAM INVENTORY REPORT
BOOTH GULCH

WATERSHED OVERVIEW

Booth Gulch is a tributary to the Clark Fork Ten Mile River. Elevations range from 400 feet at the mouth of the creek to 1,400 feet in the headwater areas. Booth Gulch confluence location is T19N R16W Sec01, 39° 32'20" N. latitude, 123°35'54" W. longitude on the USGS Sherwood Peak 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of July 17 through July 18, 1995, was conducted by Diana Hines and David Lundby. The total length of surveyed stream in Booth Gulch was 10,538 feet (2.1) miles (Table 1). There were no side channels in this creek. Flow measured at the mouth of Booth Gulch on July 18,1995 was .042 cubic feet per second (cfs).

Booth Gulch is comprised of two reaches; F3 for 8,669 feet and B2 for 1,869 feet.

Table 1 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 31%, Flatwater 36% and Pools 32% (Graph 1). Of the total survey length, Riffles comprised 22%, Flatwater 49% and Pools 13% (Graph 2).

Twelve Level IV Habitat Types were identified (Table 2). Of the Level IV Habitat Types, the most frequently occurring were Low Gradient Riffles 26%, Step Runs 20% and Mid Channel Pools 19% (Graph 3). Of the total survey length, Step Runs comprised 38%, Low Gradient Riffles and Dry Units 16% each and Runs 11% (Table 2).

Table 3 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Main pools were most often encountered at 60% occurrence and comprised 58% of the total length of pools.

Table 4 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In Booth Gulch, 75 of the 164 pools (46%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 164 pool tail-outs measured, 0% had a value of 1, 4% had a value of 2, 24% had a value of 3 and 72% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Riffles had the highest mean shelter rating at 62 (Table 1). Of the Level III Pool Habitat Types, Scour pools had the highest mean shelter rating at 48 (Table 3).

Of the 164 pools, 1% were formed by Large Woody Debris: 0% by logs and 1% by root wads (calculated from Table 5).

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 75% had gravel as the dominant substrate type (Graph 6).

Mean percent closed canopy was 91%: 54% coniferous trees and 37% deciduous trees. Mean percent open canopy was 9% (Graph 7, calculated from Table 7).

Mean percent right bank vegetated was 59% while mean percent left bank vegetated was 65%. Grass occurred most often as bank vegetation at a mean percent of 41 (of units fully measured). Cobble/Gravel occurred most often as bank substrate with a mean percent of 58 (of units fully measured) (Table 7).

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

821	HOBO TEMP site
849	HOBO TEMP site
967	log jam over stream, 10'W X 3'H X 20'L
1384	small log jam over pool 3'H X 12'W X 4'L
1546	log jam over stream 4'H X 11'W X 15'L
2149	log jam over pool 7'H X 8'W X 6'L
3020	channel type begins to change
4379	bank failure on left bank contributing gravel and cobble
4555	small trib entering left bank at 44'
5168	3' diam redwood log with channel cut in creating plunge
5930	notch log over pool with a 3' plunge
6171	notched log at head of pool creating plunge
6611	three logs at head of pool creating plunge
6929	bank failure along right bank approx 300' contributing cobble, sand and gravel
8233	log jam at 248', old road crossing at 340', wetted trib enters at 426'
9095	channel type done here
10172	trib entering right bank at 22'
10538	trib entering right bank at 94'
10538	END OF ANADROMY, stream highly embedded, approaching A2 channel type, slope approx 25%. class 3 stream approx. 1/16 mile upstream, lack of suitable spawning habitat. no fish observed for last 5 or 6 pages.

D.L.

STREAM INVENTORY REPORT
GULCH 27

WATERSHED OVERVIEW

Gulch 27 is a tributary to the Clark Fork Ten Mile River. Elevations range from 640 feet at the mouth of the creek to 2,600 feet in the headwater areas. Gulch 27 confluence location is T20N R15W Sec33, 39° 32'48" N. latitude, 123°32'07" W. longitude on the USGS Sherwood Peak 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of July 10 through July 11, 1995, was conducted by Diana Hines and David Lundby. The total length of surveyed stream in Gulch 27 was 5,831 feet (1.1 miles) (Table 1). A 30 foot waterfall (anadromous barrier) on CFT is located downstream from the Gulch 27 confluence. As a result, Gulch 27 was surveyed as fish bearing. There were no side channels in this creek. Flow measured at the mouth of Gulch 27 on July 11, 1995 was .773 cubic feet per second (cfs).

Gulch 27 is comprised of 3 reaches; B2 for 4380 feet, F2 for 1372 feet and A2 for 79 feet

Table 1 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 36%, Flatwater 30% and Pools 34% (Graph 1). Of the total survey length, Riffles comprised 32%, Flatwater 47% and Pools 22% (Graph 2).

Nine Level IV Habitat Types were identified (Table 2). Of the Level IV Habitat Types, the most frequently occurring were Low Gradient Riffles 20% and Mid Channel Pools 16% (Graph 3). Of the total survey length, Step Runs comprised 37% and Low Gradient Riffles 17% (Table 2).

Table 3 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Main pools were most often encountered at 58% occurrence and comprised 64% of the total length of pools.

Table 4 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In Gulch 27, 33 of the 45 pools (73%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 45 pool tail-outs measured, 0% had a value of 1, 13% had a value of 2, 19% had a value of 3 and 68% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Riffles had the highest mean shelter rating at 56 (Table 1). Of the Level III Pool Habitat Types, Main pools had the highest mean shelter rating at 60 (Table 3).

Of the 45 pools, 9% were formed by Large Woody Debris: 0% by logs and 9% by root wads (calculated from Table 5).

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 75% had small cobble as the dominant substrate type (Graph 6).

Mean percent closed canopy was 85%: 19% coniferous trees and 66% deciduous trees. Mean percent open canopy was 15% (Graph 7, calculated from Table 7).

Mean percent right bank vegetated was 64% while mean percent left bank vegetated was 69%. Deciduous trees occurred most often as bank vegetation at a mean percent of 42 (of units fully measured). Cobble/Gravel occurred most often as bank substrate with a mean percent of 45 (of units fully measured) (Table 7).

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

233	3" of undercut bank under root wad
1338	LWDA 10'HX15'WX12'L
1658	LWDA 20'WX7'HX15'L
2388	LWDA 8'WX10'HX20'L
2751	LWDA 17'HX30'WX50'L retaining gravel and fines
2771	LWDA 10'HX40'WX15'L
2829	RBA site
4863	trib enters RB--comparable flow and possible thermal refuge, however lack of suitable spawning habitat. Steep grade an 10' waterfall render it useless for anadromous fishes...ocular survey of 1/4 mile no fish obs.
5312	possible fish barrier
5412	possible fish barrier
5691	RB failure 100'HX40'W contributing fines and gravel.
5831	END OF SURVEY. 1st drop 15'= possible barrier. 2nd drop 17' = possible barrier. ocular survey 440' no fish obs

D.L.

STREAM INVENTORY REPORT
SOUTH FORK TEN MILE RIVER

WATERSHED OVERVIEW

The South Fork Ten Mile River is a tributary to the Ten Mile River. Elevations range from 20 feet at the mouth to 3,000 feet in the headwater areas. South Fork Ten Mile River confluence location is T19N R17W Sec03, 39° 32'23" N. latitude, 123°44'42" W. longitude on the USGS Dutchmans Knoll 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of June 15 through July 14, 1994, was conducted by Warren Mitchell and David Lundby. The total length of stream in South Fork Ten Mile River surveyed was 111,369 feet (21.1 miles) (Table 1). Side channels comprised 2,101 feet of this total.

South Fork Ten Mile River is comprised of five reaches; B4 for 69,674 feet, F4 for 1216 feet, C4 for 15322 feet, B4 for 7,074 feet, and C4 for 708 feet.

Table 1 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 22%, Flatwater 33% and Pools 43% (Graph 1). Of the total survey length**,** Riffles comprised 14%, Flatwater 55% and Pools 31% (Graph 2).

Seventeen Level IV Habitat Types were identified (Table 2). Of the Level IV Habitat Types, the most frequently occurring were Low Gradient Riffles 22%, Runs 16% and Mid Channel and Lateral Scour Log Pools 11% each (Graph 3). Of the total survey length, Step Runs comprised 37%, Runs 17 % and Low Gradient Riffles 14% (Table 2).

Table 3 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Scour pools were most often encountered at 73% occurrence and comprised 71% of the total length of pools.

Table 4 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In South Fork Ten Mile River, 428 of the 554 pools (77%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 554 pool tail-outs measured, 0% had a value of 1, 0% had a value of 2, 26 had a value of 3 and 74% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Pools had the highest mean shelter rating at 41 (Table 1). Of the Level III Pool Habitat Types, Scour pools had the highest mean shelter rating at 44 (Table 3).

Of the 554 pools, 36% were formed by Large Woody Debris: 24% by logs and 12% by root wads (calculated from Table 5).

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 88% had gravel as the dominant substrate (Graph 6).

Mean percent closed canopy was 77%: 36% coniferous trees and 41% deciduous trees. Mean percent open canopy was 23% (Graph 7, calculated from Table 7).

Mean percent right bank vegetated was 60% while mean percent left bank vegetated was 63%. Deciduous trees occurred most often as bank vegetation at a mean percent of 47 (of units fully measured). Sand/Silt/Clay occurred most often as bank substrate with a mean percent of 84 (of units fully measured) (Table 7).

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

9926	2nd bridge crossing, camp 1 bridge, barbed wire across creek.
10101	LB failure 18'LX20'H contributing fines
10395	partial gravel dam approx. 3/4 stream closure
10782	smith creek enters RB at 244'
10912	massive pool conglomerate. starts with a 5.3 to a 5.1
13996	dry trib drains from 7' culvert from RB at 164'
14810	several old car frames scattered
19061	SWD jam- so thick you can walk on the flotilla... grass and brush are growing on it.
19543	Campbell creek enters RB
25614	3rd bridge crossing.. Little Valley / Fastrack haul road
28967	SWD jam is mashed along R.B. 30X17X10
29601	RBA site SFTM#1
29825	SWD jam floating over the deepest part
30317	RB. erosion 11'LX13'H contributing gravel and fines
33802	redd in riffle
34025	redd in riffle
37273	SWD jam collecting against a fallen willow tree forming the pool
42506	A.J. cabin porch
46782	Churchman enters L.B.
56679	L.B. failure contributing gravel and fines.. tree from failure is in creek collecting LWD
59339	small trib enters L.B. at top of unit via 10'

	waterfall
59495	small seep enters L.B.
61636	seep enters L.B.
63018	trib enters R.B. at top of unit
65135	fallen fir tree in creek due to L.B. failure
75374	camp 28 pool
75554	deep pools separated by bedrock sheets and falls (4'-7' high)
75847	small spring enters left bank
76819	confluence with redwood creek entering right bank.
77037	two Steelhead redds in tail
77299	HOBO TEMP site.
77384	log jam-LWD
77983	small seep enters RB at 90'
79198	redd at tail
80234	large accumulation of bucked LWD on R.B.
80301	alder tree in creek as a result of L.B. failure contributing fines- dimensions L15'XH10'
80882	left bank slide (20'H X 20'L) contrib. gravel, fines and a boulder. Bedrock underlies slide.
83083	dry trib. entering LB
83165	r.h.w.p. nest in tree on left bank
83474	LB failure contributing fines 20'lX30'h. Good site for restoration for fish cover.
83856	RB failure contributing franciscan melange
84026	gulch 11 enters left bank
84077	HOBO TEMP site
85499	unstable right bank contributing gravel and cobble
86774	small dry trib enters left bank
86948	CCC firewood pile on left bank fallen pine tree length wise in creek
87420	RB failure contributing fines
88432	C.C.C."creek restoration" LWD cut up into little pieces on LB
89504	trib enters LB
90109	small alder collapsed from R.B. contributing fines.
90407	dry trib enters RB
90609	RB failure 40'lX20'h contributing fines
91675	dry trib enters LB

92457	flow is no longer plunging- has dried up and now filters through retained gravel and sand
92737	small trib enters LB at top of unit water temp 54
93992	log jam 35'lX20'wX8'h retaining gravel and cobble
94016	small log jam at top of unit
94713	dry trib enters RB at 54'
95000	LB slumping contributing fines
95682	dry trib enters LB
96907	RR trestles in creek are collecting SWD and retaining some gravels and fines.
96917	log jam 71'lX37'wX12'h at high flows the river backs up and scours around the LB. causing failure contributing fines. this one needs help! this year. slide is 40' l X50' h
97323	small trib enters LB
97511	LB failure bringing 2 redwood trees into creek; starting to collect L&SWD
97923	LB root wad with trees calved off LB unstable & flowing in the stream.
98084	this unit is strewn with S&LWD, some of which is retaining sand and gravel. LB has several redwood clusters ready to topple into creek.
98783	dry trib enters RB log jam 54'lX26'wX9'h covers part of unit.
99265	log jam 53'lX24'wX8'h--possible barrier--remove.
100364	not plunging in low flows
101648	channel type done here
102601	RBA site sftm#5
102615	HOBO TEMP site
102857	log accumulation
103242	small LWDA 12'lX10'wX5'h (over pool)
103364	RB failure contributing fines
103474	scattered LWD
103495	log jam pool 21X28X26 retaining gravels and sand.
104155	small trib enters LB.
104998	logjam 25X28X9 retaining gravel- 9' wall of debris a definite factor for anadromous passage.
105550	LWD is catching on RR trestles and retaining gravels.
105827	LWDA retaining gravels-- 5' high for 150'

105874	LWDA retaining fines--needs removing
106021	no longer plunging
106554	RB comprised of franciscan melange
106667	YOY observed
106924	dry trib entering LB at top of unit
106945	log jam plunge pool combo retaining gravel and cobble
107162	LB at 96' is scoured with exposed roots contributing fines. LWDA at top of unit 10'X26'X8' is retaining gravel to boulders for hundreds of feet upstream.
107440	YOY obs.
107837	LWDA 8X20X6 retaining gravel and sand.
108102	dry gully trib enters LB
108291	channel type is changing-- gradient inc.
108467	dry trib enters RB.
109267	END OF ANADROMY dry, not plunging, (8'), LDA- (12'LX17'WX10'H) Channel getting narrower and steeper (A-1) flow would be difficult to contend with. Have not seen any fish since unit # 1211. This unit should be considered End of Anadromy due to the gradient and plunge height.

D.L.

STREAM INVENTORY REPORT
SMITH CREEK

WATERSHED OVERVIEW

Smith Creek is a tributary to the South Fork Ten Mile River. Elevations range from 40 feet at the mouth of the creek to 1,480 feet in the headwater areas. Smith Creek confluence location is T19N R17W Sec11, 39° 31'33" N. latitude, 123°43'47" W. longitude on the USGS Dutchmans Knoll 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of August 9 through August 10, 1994, was conducted by Warren Mitchell and David Lundby. The total length of stream in Smith Creek surveyed was 33,352 feet (6.3 miles) (Table 1). There were no side channels in this creek

Smith Creek is comprised of two reaches; C4 for 26,044 feet and B4 for 6,802 feet.

Table 1 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 27%, Flatwater 29% and Pools 40% (Graph 1). Of the total survey length, Riffles comprised 21%, Flatwater 53% and Pools 21% (Graph 2).

Twelve Level IV Habitat Types were identified (Table 2). Of the Level IV Habitat Types, the most frequently occurring were Low Gradient Riffles 27%, Step Runs 19% and Lateral Scour Log Pools 16% (Graph 3). Of the total survey length, Step Runs comprised 45%, Low Gradient Riffles 20 % and Runs and Lateral Scour Log Pools 8% each (Table 2).

Table 3 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Scour pools were most often encountered at 78% occurrence and comprised 78% of the total length of pools.

Table 4 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In Smith Creek, 107 of the 246 pools (43%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 246 pool tail-outs measured, 0% had a value of 1, 0% had a value of 2, 16% had a value of 3 and 84% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Pools had the highest mean shelter rating at 31 (Table 1). Of the Level III Pool Habitat Types, Scour pools had the highest mean shelter rating at 34 (Table 3).

Of the 246 pools, 54% were formed by Large Woody Debris: 38% by logs and 15% by root wads (calculated from Table 5).

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 99% had gravel as the dominant substrate (Graph 6).

Mean percent closed canopy was 83%: 36% coniferous trees and 47% deciduous trees. Mean percent open canopy was 17% (Graph 7, calculated from Table 7).

Mean percent right bank vegetated was 70% while mean percent left bank vegetated was 74%. Brush occurred most often as bank vegetation at a mean percent of 56 (of units fully measured). Sand/Silt/Clay occurred most often as bank substrate with a mean percent of 96 (of units fully measured) (Table 7).

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

284	1st bridge crossing
6286	LWDA
8580	LWDA 18'WX15'lX5'H
11198	LWDA 10'LX19'WX4'H
11607	LWDA 29'LX38'WX5'h retaining gravel and small cobble
13661	LWDA 23'WX19'lX9'H retaining gravel and cobble
15111	LWDA 21'LX28'WX7'H retaining gravel and cobble blocking creek
15283	YOY obs.
15900	LWDA 25'WX8'lX5'h retaining SWD and gravel/cobble
16522	LWDA 31'LX28'WX7'H retaining gravel/cobble
16535	YOY obs.
16793	LWDA 30'LX20'WX6'H retaining gravel/cobble
16909	YOY obs.
18466	LWDA 23'LX19'WX5'H
19025	LWDA 15'WX20'LX5'H retaining gravel/cobble
19418	LWDA 10'WX27'LX5'H
22212	LWDA retaining gravel cobble and sand
22351	LWDA 18'WX40'LX5'H retaining gravel and sand
23473	LWDA 26'WX9'LX4'H
25476	LWDA 18'WX12'LX5'H retaining gravel and sand
26926	LWDA 17'WX24'LX8'H retaining gravel and cobble
30271	root wad retaining WD, gravel and cobble
30382	LWDA 17'WX6'LX5'H retaining gravel and cobble
30630	LWDA 24'LX12'WX6'H
32258	YOY obs.
32514	END OF ANADROMY.. creek forks at 60'. R fork intermittent and gradient increases--no suitable

habitat for anadromous fishes. L fork
intermittent and gradient increases.. no barriers
but no suitable habitat for anadromous fishes.

D.L.

STREAM INVENTORY REPORT
CAMPBELL CREEK

WATERSHED OVERVIEW

Campbell Creek is a tributary to the South Fork Ten Mile River. Elevations range from 40 feet at the mouth of the creek to 1,500 feet in the headwater areas. Campbell Creek confluence location is T19N R17W Sec14, 39° 30'43" N. latitude, 123°43'15" W. longitude on the USGS Dutchmans Knoll 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of August 15 through August 16, 1994, was conducted by Warren Mitchell and David Lundby. The total length of surveyed stream in Campbell Creek was 19,193 feet (3.6 miles) (Table 1). Side channels comprised 162 feet of this total.

Campbell Creek is comprised of two reaches; B4 for 11,623 feet and C4 for 7,408 feet.

Table 1 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 26%, Flatwater 30% and Pools 42% (Graph 1). Of the total survey length, Riffles comprised 19%, Flatwater 53% and Pools 25% (Graph 2).

Thirteen Level IV Habitat Types were identified (Table 2). Of the Level IV Habitat Types, the most frequently occurring were Low Gradient Riffles 26%, Step Runs 16% and Runs 14% (Graph 3). Of the total survey length, Step Runs comprised 42%, Low Gradient Riffles 19 % and Runs 11% (Table 2).

Table 3 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Scour pools were most often encountered at 76% occurrence and comprised 73% of the total length of pools.

Table 4 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In Campbell Creek, 52 of the 149 pools (35%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 149 pool tail-outs measured, 0% had a value of 1, 0% had a value of 2, 13% had a value of 3 and 87% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Pools had the highest mean shelter rating at 29 (Table 1). Of the Level III Pool Habitat Types, Scour pools had the highest mean shelter rating at 33 (Table 3).

Of the 149 pools, 51% were formed by Large Woody Debris: 32% by logs and 18% by root wads (calculated from Table 5).

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 98% had gravel as the dominant substrate (Graph 6).

Mean percent closed canopy was 83%: 31% coniferous trees and 52% deciduous trees. Mean percent open canopy was 17% (Graph 7, calculated from Table 7).

Mean percent right bank vegetated was 71% while mean percent left bank vegetated was 73%. Brush occurred most often as bank vegetation at a mean percent of 40 (of units fully measured). Sand/Silt/Clay occurred most often as bank substrate with a mean percent of 95 (of units fully measured) (Table 7).

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

236	1st bridge crossing
771	2nd bridge crossing
3222	RBA site 1
3253	hobo temp site
5999	LWDA Retaining gravel
7083	fallen alder retaining WD, cobble and gravel
8380	LB failure 60'Lx14'H
8961	LWDA 15'x25'x4'
10245	LWDA 40'Lx12'Wx5'H formed pool retaining gravel
12013	RR trestles holding fallen bay forcing flow to scour LB
12486	LWDA 20'Wx7'Lx5'H retaining gravel and sand
18306	2 LWDA's both 20'Wx12'Lx5'H retaining SWD, gravel
18395	log retaining gravel cobble
18440	collapsed Humboldt crossing is forming LWDA 36'Lx19'Wx6'H retaining sand , gravel and SWD
19031	END OF ANADROMY: creek splits into two equal flows. R. fork no fish observed.. channel becomes narrow and gradient increases. L fork had YOY scattered throughout until gradient increased.. flow goes intermittent.. no spawning habitat past this point

D.L.

STREAM INVENTORY REPORT
CHURCHMAN CREEK

WATERSHED OVERVIEW

Churchman Creek is a tributary to the South Fork Ten Mile River. Elevations range from 120 feet at the mouth of the creek to 1,600 feet in the headwater areas. Churchman Creek confluence location is T19N R16W Sec20, 39° 29'13" N. latitude, 123°40'10" W. longitude on the USGS Noyo Hill 7.5 minute quadrangle.

HABITAT INVENTORY RESULTS

The habitat inventory of July 30 through August 1, 1994, was conducted by Warren Mitchell and David Lundby. The total length of surveyed stream in Churchman Creek was 23,050 feet (4.4 miles) (Table 1). There were no side channels in this creek.

Churchman Creek is comprised of two reaches; B4 for 20,465 feet and B3 for 2,561 feet.

Table 1 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 22%, Flatwater 38% and Pools 32% (Graph 1). Of the total survey length, Riffles comprised 11%, Flatwater 62% and Pools 8% (Graph 2).

Thirteen Level IV Habitat Types were identified (Table 2). Of the Level IV Habitat Types, the most frequently occurring were Step Runs 30%, Low Gradient Riffles 21% and Lateral Scour Log Pools 13% (Graph 3). Of the total survey length, Step Runs comprised 59%, Dry Units 20% and Low Gradient Riffles 10 % (Table 2).

Table 3 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Scour pools were most often encountered at 72% occurrence and comprised 72% of the total length of pools.

Table 4 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In Churchman Creek, 22 of the 87 pools (25%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 87 pool tail-outs measured, 0% had a value of 1, 0% had a value of 2, 2% had a value of 3 and 98% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Pools had the highest mean shelter rating at 39 (Table 1). Of the Level III Pool Habitat Types, Scour pools had the highest mean shelter rating at 43 (Table 3).

Of the 87 pools, 51% were formed by Large Woody Debris: 41% by logs and 9% by root wads (calculated from Table 5).

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 96% had gravel as the dominant substrate (Graph 6).

Mean percent closed canopy was 90%: 36% coniferous trees and 54% deciduous trees. Mean percent open canopy was 10% (Graph 7, calculated from Table 7).

Mean percent right bank vegetated was 67% while mean percent left bank vegetated was 70%. Deciduous trees occurred most often as bank vegetation at a mean percent of 51 (of units fully measured). Sand/Silt/Clay occurred most often as bank substrate with a mean percent of 95 (of units fully measured) (Table 7).

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

125	SWD jam (15'WX10'LX3'H) retaining gravel and fines
619	HOBO TEMP SITE
1603	fallen bay tree causing SWD and gravel retention
2922	LWDA (15'WX10'LX5'H)
10136	LWDA 18'WX10'LX5'H
10412	RB failure
10439	LWDA 22'WX15'LX8'H
10715	LWDA 17'LX10'WX6'H formed pool
11511	3 fallen logs perpendicular. to creek retaining SWD and gravel
12498	Steelhead redd
12809	4' plunge over bedrock
13003	YOY obs.
13543	LWDA 20'WX11'LX5'H retaining gravel and cobble
15789	YOY obs
16243	LB failure 12'LX18'H
17659	YOY obs
20281	LWDA retaining gravel
22879	creek forks at 70'--continue survey up main fork
23050	END OF ANADROMY: channel type goes to A1 beginning with a 1.2 for 100+' in a high gradient

D.L.

STREAM INVENTORY REPORT
REDWOOD CREEK WATERSHED

WATERSHED OVERVIEW

Redwood Creek is a tributary to the South Fork Ten Mile River. Elevations range from about 320 feet at the mouth of the creek to 2,800 feet in the headwater areas. Redwood Creek confluence location is T19N R16W Sec23, 39°29'34" N. latitude, 123°36'24" W. longitude on the USGS Northspur 7.5 minute quadrangle. The results from Redwood Creek and its surveyed tributary, North Fork Redwood Creek, are presented as the Redwood Creek Watershed unless otherwise stated

HABITAT INVENTORY RESULTS

The habitat inventory of July 25 through July 27, 1994 was conducted by Warren Mitchell and David Lundby. The total length of surveyed stream in Redwood Creek was 24,268 feet (4.6 miles). Side channels comprised 276 feet of this total. The total length of North Fork Redwood Creek was 2,410 feet (.5 miles). The total length of stream surveyed in the Redwood Creek Watershed including side channels was 26,678 feet (5.1 miles) (Table 1).

Redwood Creek is comprised of one reach for the entire 24,268 feet of creek and is a B4 channel type. North Fork Redwood Creek is a B4 for 2,410 feet.

Table 1 summarizes the Level II Habitat Types: Riffle, Flatwater, Pool and Dry. Of the Level II Habitat Types, Riffles comprised 21%, Flatwater 34% and Pools 42% (Graph 1). Of the total survey length, Riffles comprised 13%, Flatwater 66% and Pools 19% (Graph 2).

Seventeen Level IV Habitat Types were identified (Table 2). Of the Level IV Habitat Types, the most frequently occurring were Step Runs 26%, Low Gradient Riffles 18% and Mid Channel Pools 14%(Graph 3). Of the total survey length, Step Runs comprised 62%, Low Gradient Riffles 11% and Mid Channel Pools 6% (Table 2).

Table 3 summarizes Main, Scour and Backwater pools which are Level III Pool Habitat Types. Scour pools were most often encountered at 61% occurrence and comprised 58% of the total length of pools.

Table 4 is a summary of maximum pool depths by Level IV Pool Habitat Types. Pools with depths of two feet or greater are considered optimal for fish habitat. In the Redwood Creek Watershed, 79 of the 141 pools (56%) had a depth of two feet or greater (Graph 4).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 332 pool tail-outs measured in Redwood Creek Watershed, 0% had a value of 1, 0% had a value of 2, 12% had a value of 3 and 88% had a value of 4 (Graph 5).

Of the Level II Habitat Types, Pools had the highest mean shelter rating at 31 (Table 1). Of the Level III Pool Habitat Types, Scour pools had the highest mean shelter rating at 36 (Table 3).

Table 6 summarizes dominant substrate by Level IV Habitat Types. Of the Low Gradient Riffles fully measured, 89% had gravel as the dominant substrate type (Graph 6).

Of the 141 pools, 31% were formed by Large Woody Debris: 25% by logs and 6% by root wads (calculated from Table 5).

Mean percent closed canopy was 84%: 56% coniferous trees and 28% deciduous trees. Mean percent open canopy was 16% (Graph 7, calculated from Table 7).

Mean percent right bank vegetated was 55% while mean percent left bank vegetated was 54%. Brush occurred most often as bank vegetation at a mean percent of 38 (of units fully measured). Sand/Silt/Clay occurred most often as bank substrate with a mean percent of 92 (of units fully measured) (Table 7).

The following memos were taken in the field at the time of survey. All distances are approximate and measured in feet from the confluence.

North Fork Redwood Creek

527	small log jam 20'WX8'LX3'H forming pool below
1466	YOY obs
1484	stream forks, smaller fork goes intermittent...no fish obs
2143	YOY & 2+ STHD obs
2410	END OF ANADROMY... unit goes into A1 channel type. boulder/log gradient for 60' high differential of stream level. channel flattens out above A1 section...no fish obs.

Redwood Creek Mainstem

3007	RB failure 20'LX20'H contrib. fines
3609	LWDA 18'LX27'WX8'H forms pool
3718	LWD cover is old RR trestle
3754	RBA SITE .. also first bridge crossing
4459	HOBO TEMP SITE
5049	dry trib enters LB
5256	LB failure 15'LX10'H contrib. fines
5521	unit runs behind redwood stabilization unit -- needs work
5555	LWDA 25'WX11'LX9'H forming pool and retaining gravel
5872	trib enters RB contains fish
6520	RB failure

7605	LWDA 37'WX16'LX10'H
10977	LB failure 25'WX80'H
11811	LWDA 25'WX18'LX6'H retaining gravel
12909	RBA SITE
12925	HOBO TEMP SITE
13514	LWDA forming pool
13886	LWDA over parts of unit retaining SWD
14454	LWDA 15'LX20'W retaining SWD
14797	SWDA
15770	RB failure 15'WX20'H also a LWDA retaining gravel
16429	SWDA 10'LX10'WX4'H
17566	LWDA 23'LX15'WX4'H AT 344' resulting in LB scour
17849	SWDA 10'LX6'WX4'H
18224	LB failure 60'LX30'H partially re-vegetated
18827	SWDA
19097	SWDA 14'WX12'LX5'H
22140	LWDA 17'LX15'WX5'H retaining gravel
22243	LWDA
22258	LWDA
23139	LWDA 11'LX30'WX6'H
23992	END OF ANADROMY.. A1 channel type.. accumulation of boulders and LWD in a 36% gradient.

D.L.